Warming Homes, Cooling the Planet: An Analysis of Socio-Techno-Economic Energy Efficiency Policy and Practice in the UK

POWELLS, GARETH,DOUGLAS

Warming Homes, Cooling the Planet: An Analysis of Socio-Techno-Economic Energy Efficiency Policy and Practice in the UK

Thesis Submitted for the Degree of Doctor of Philosophy

Gareth Douglas Powells, 2009.

Department of Geography

Durham University

United Kingdom

Supervised by Doctor Harriet Bulkeley and Professor Susan J. Smith

Abstract

Energy efficiency governance in the UK is a crucial component of tackling climate change as around 27% of UK carbon dioxide emissions come from homes (DEFRA, 2006). However, the UK has approximately 30,000 excess winter deaths every year (Help The Aged, 2007) and over 5 million UK households were in fuel poverty in 2008 (NEA, 2008) as a result of interactions between high energy costs, poor energy efficiency practices, problematic materialities and low incomes. These hugely important issues are made difficult to resolve as a result of the powerful and far reaching social, technical and economic relationships, flows and fixities that constitute energy networks. The thesis focuses on the challenges faced by householders in their everyday use of energy and how, in different ways, they engage with and disengage from governing agencies, and the issues of fuel poverty and climate change. It analyses how attempts to address the issues are coordinated locally, in three areas of the North of England, and in national policy arenas. In particular, attention is paid to the sometimes synergistic yet sometimes problematic outcomes that result when attempts to reduce carbon dioxide emissions from homes become entangled with efforts to make energy more affordable for those vulnerable to fuel poverty.

Keywords: energy efficiency, practice, policy, fuel poverty, EEC, CERT, governance.

Acknowledgements

This project would not have been possible without the support of the ESRC and NEA in the form of a CASE studentship for which I am very grateful.

Thank you to Doctor Harriet Bulkeley and Professor Susan J. Smith, whose blend of skills and abilities made for a particularly well balanced supervision team, for their generosity in sharing with me their time, ideas and experience. I am also hugely grateful to David, Helen, Ron, Neil, Jenny and the team at NEA whose contribution to the thesis was far greater than they will realise. I would also like to acknowledge the work of Nick Merleau-Ponty whose contribution to the thesis was cut tragically short.

I would also like to thank fellow students in W201, W201a and W401 for their academic and social support, the Misfits 5-a-Side and Adventure squad for providing an escape from the thesis, and in particular Doctor James Bridges for his friendship and for setting such an inspirational example.

I am also eternally grateful to my family, particularly my parents, for always supporting and encouraging me to learn and to value education. Finally, and most importantly, thank you to Stephanie, who in the middle of all this became my wife, for her endless patience, for sharing with me her unique perspective on life and for her love.

List of Figures

List of Tables

List of Abbreviations

ANT	Actor-Network-Theory
CASE	Collaborative Awards in Science and Engineering
CEEAC	Cumbria Energy Efficiency Advice Centre
CERT	Carbon Emissions Reduction Target
CSE	Centre for Sustainable Energy
DBERR	Department for Business, Enterprise and Regulatory Reform
DCLG	Department for Communities and Local Government
DECC	Department for Energy and Climate Change
DEFRA	Department for the Environment, Farming and Rural Affairs
DHS	Decent Homes Standards
DTI	Department for Trade and Industry
EEC	Energy Efficiency Commitment
EESOP	Energy Efficiency Standards of Performance
ESRC	Economic and Social Research Council
EST	Energy Savings Trust
GP	Gareth Powells
HECA	Home Energy Conservation Association or Home Energy Conservation Act
KES	Kirklees Energy Services
NEA	National Energy Action
NGE	Niche Governance Entrepreneur
STS	Science and Technology Studies

Contents

Chapter One: Introduction

"I say the debate is over. We know the science, we see the threat, and the time for action is now."

(Arnold Schwarzenegger, Speech at the United Nations World Environment Day Conference, San Francisco, June 8th, 2005 cited in Palousis, 2005)

The debate over climate change in the first decade of this new millennium has shifted from, 'Is it definitely happening?' to, 'What are we going to do about it?' (See Pettenger, 2007). An increased sense of urgency in political discourse has been documented in the creation of a raft of new legislation and white paper targets aiming to reduce carbon dioxide emissions both in the near future, and far into the middle of the century[1]. These moves have been accompanied by a barrage of media messages asking that individuals curtail their energy use in order to 'do their bit' for the environment, and it is the home in particular that is identified as the site where individuals can do most to reduce their energy consumption. Current estimates suggest that home energy use generates 27% of UK carbon dioxide (DTI, 2002; DEFRA, 2002), and that energy use in the domestic sector has risen at a higher rate than in industry or transport, the two other main sources of carbon dioxide (Boardman et. al., 2005). The home is therefore a key target for intervention to address climate change.

[1] The UK government are legally required to reduce carbon dioxide emissions by 20% of 1990 levels by 2010 (DTI 2003), and by 80% of 1990 levels by 2050 (DECC, 2009).

While the energy intensity of every day live grows relentlessly however, 5 million UK households will spend more than 10% of their income on energy bills in the winter of 2008 - 2009, a rise of 2 million from 2004 when fuel prices were at their lowest for decades (NEA, 2008), pushing more households than ever deeper into the mire of fuel poverty. The combined effects of high fuel bills, low income and poorly performing buildings, technologies and infrastructures mean that they face a cocktail of consequences including debt, disconnection, cardiovascular and respiratory health problems, mental health issues and at worst an increased chance of not making it through the winter. For particularly vulnerable groups like the elderly and the very young these conditions mean higher rates of hospitalisation and death. There were over 30,000 excess winter deaths in 2004 - 2005 (Age Concern, 2008). That those people were old, poor and died quietly in their homes makes it easier for their deaths to slip past us unnoticed every year.

When lifted off the page the two issues of climate change and fuel poverty affect people living in the same streets, drawing energy from the same infrastructures, paying the same companies ever rising bills and, of course, living on the same planet. It takes only the most cursory glance at the most commonly suggested remedies – using green energy tariffs which use energy drawn from renewable sources that are more expensive than regular tariffs, or a carbon tax on energy bills to give just two examples - to see that although they are endlessly intertwined and that using less energy does, on the face of it, cost less, the two issues must overcome serious tensions if they are to be more synergistic than antagonistic: the more that price is used as a signal to deter

energy use the less affordable it becomes for the poor; the more investment in low carbon technology is paid for through taxes or supplements added to energy bills the higher those bills are for those least likely to benefit from the new, still expensive technology; the more messages there are to reduce energy the less clear it is to those already under-heating their homes that they should be turning their heating up, and the more difficult life gets for those on low incomes who live in energy inefficient homes. The conflicts run the other way too, as efforts are made to encourage cold, low income homes to use more energy their carbon dioxide emissions rise, resulting in increased vulnerability to environmental and climatic hazards of some of the world's poorest people (See Walker et. al., 2006; Okereke, 2006; Alario and Freudenburg, 2008). The list of tensions could go on, but there is also great potential in the common goal of meeting energy needs efficiently and without waste which mean that environmental and social objectives can both be achieved. This thesis is a modest attempt to illuminate these tensions while also analysing how they are produced by the interacting governance processes circulating around domestic energy policies and politics. The various effects of government policies and the potential they have to address these urgent and important issues are analysed by studying the ways in which social, technical and economic aspects of energy networks are interrelated, and how governments, businesses, technologies, markets and domestic energy users engage with one another.

This introductory chapter sets out the context for the research by introducing the political and policy backgrounds for energy efficiency in the UK and by defining and providing an overview of fuel poverty as a policy issue. After this the research

questions around which the project has been designed are listed to communicate the project's focus on contestation between carbon dioxide emissions reduction and fuel poverty alleviation. Finally the chapter explains how the thesis is structured and provides an outline of each subsequent chapter.

1.1 Research Context

Climate change mitigation is an issue with a well established academic as well as non academic research community already working on its many faces. For many the political life of climate change as it is now known began in Rio de Janeiro in 1992. In the UK however, fears about the changing climate had been acknowledged by the Thatcher government's White Paper of 1990, *This Common Inheritance* (Department of the Environment, 1990), which was encoded with a set of moral obligations to future generations that were informed by the 1987 *Our Common Future* report from the Bruntland Commission's definition of sustainable development as '*meeting the needs of the present without compromising the needs of future generations to meet their own needs*'.

The strength of the sustainable development narrative grew considerably in the 1990s and the greenhouse effect became increasingly widely accepted with each subsequent expert report (Newel, 2000) to the extent that now "scientific opinion overwhelmingly favours the view that climate change in the last century is an unnatural event. We have done it to ourselves." (Pettenger, Pxii) (For a more lengthy discussion of the social construction of climate change see Pettenger [Ed], 2007). Since 1992 the home has been constructed as a key site for the reduction of carbon dioxide emissions in the UK.

This can be seen in the 'Helping the Earth Begins at Home campaign of the 1990s and the Energy White Paper of 2003 identifying that 27% of all UK carbon dioxide emissions come from domestic energy use (DTI, 2003).

Research into the geographies of climate change has grown considerably, as a visit to any geography department website will testify. Meanwhile, in the policy arena and in the media climate change now has an extremely high profile with several large policy programs created in the last ten years. Most recently climate change has been framed as an energy issue (Lovell et. al., 2008) and it is here, where it has become entangled with other pressing problems, that the thesis is focussed.

In contrast fuel poverty is an issue which can be traced back to the oil crises of the early 1970s and beyond but which has enjoyed a far more modest profile in energy policy and research arenas, despite the issues of cold, damp homes being identified as seriously problematic by research dating back several decades into the twentieth century (Parker Morris, 1961; Wicks, 1978; Donnison, 1982; Boardman, 1991). Recently however the issue has been reconfigured and entangled with the burgeoning sustainability discourse. This is partly due to the effective policy work of various agencies and the energy price rises of well over 100% between 2004 and 2008 (NEA, 2008a), and the challenge of transforming the technologies and markets of energy use in the UK which has begun to attract the attention of the media as well that of the research community (Giddings and Underwood, 2007; Rutledge, 2007; Walker, 2008; Power, 2008).

What has not been comprehensively addressed in the existing research base however is an effort to consider the potential to tackle fuel poverty and climate change in a coordinated, joined up way; as well as the realities of current attempts to do so. This is where this thesis sits - aiming to address the need to understand how attempts to cool the planet can work with rather than against efforts to warm the homes of vulnerable households in England.

The governmentally accepted definition of fuel poverty is that the fuel poor are those who would need to spend over 10% of their income on fuel in order to heat their homes to an adequate level (Boardman, 1991). While this provides a good shorthand understanding of the issue, in reality several aspects of the working definition are problematic. Firstly the definition of income is a matter of contestation as the government uses income including housing related benefits whereas several lobbying organisations argue that fuel poverty should be calculated using disposable income after housing costs have been deducted. Not doing so, it is suggested, hides the problems faced by millions of people on very low incomes who are unable to change their housing circumstances or do much to change the energy performance of their homes as households in receipt of housing benefit will be tenants rather than owner occupiers. Secondly it is notoriously difficult to obtain the required information about individuals to determine whether or not they are fuel poor as it requires a community practitioner or a central government statistician to know what a household's incomes are from employment, pensions and the state, what their fuel bills are. This would require the sharing of data between government departments and between government and the energy retailers which has not happened thus far but is currently an issue under

discussion in policy consultations. Defining, and therefore measuring fuel poverty is difficult and as a result targeting policy interventions at the fuel poor is far from straight forward as has been the experience in the UK in recent years. The core policies developed to tackle energy efficiency are detailed in Section 4 of this chapter.

While Sefton is right to insist that "the main cause of fuel poverty is a combination of poor energy efficiency and low income" (Sefton, 2002, p370), this concise summary overlooks the importance of fuel prices in influencing fuel poverty numbers since the huge increases in prices in recent years [2]. As Wright argues, rather than poor energy performance of buildings and technologies causing fuel poverty, it is large fuel bills which are most likely to move a household into fuel poverty, "The fact that 20% of fuel-poor households have SAP[3] (standard assessment procedure) ratings of 50 or more demonstrates that poor energy efficiency is not the only cause of fuel poverty" (Wright, 2004, p492). One must ask however what causes fuel bills to be disproportionately large relative to income. The thesis argues that the costs of energy use are more multi-faceted however and that bills are determined by energy prices, technology in the home, and domestic practices of energy consumption and conservation as well as poor thermal efficiency, and furthermore, that it makes sense to think of energy prices and tariffs as socially, technically and economically structured. All of these factors combine to create large fuel bills. On the other hand however,

[2] The Average UK domestic electricity bill rose by 25% between 2005 and 2007 while average gas prices rose by 54% in the same period, making the average combined energy bill in the UK £935 in 2007 (Sustainable Development Commission, 2008).

[3] SAP stands for Standard Assessment Procedure, a nationally recognised rating system for the energy efficiency of buildings where SAP 100 indicates no heating or hot water costs. The average SAP rating of a UK dwelling is SAP 50 (DCLG, 2007), while a home with a SAP rating of less than 35 is considered to be a hazard under the Housing Health and Safety Rating System (HHSRS).

where incomes are low, fuel bills will be proportionately larger, increasing vulnerability regardless of the other factors.

Taken together these various aspects of fuel poverty can be distilled into four factors, each of which make up a four part fuel poverty model: income, energy technology present in the home, energy prices, practices which diagrammatically would look something like Figure 1.1 when the household is not in fuel poverty - if income is great enough no amount of poor technology, inefficient energy use or expensive energy prices will make it fuel poor. If however, either the technical setting, energy use practices or energy prices become too ‘heavy’ even a household with a modest income, such as a single income household, could become fuel poor, as in Figure 1.2.

Figure 1.1

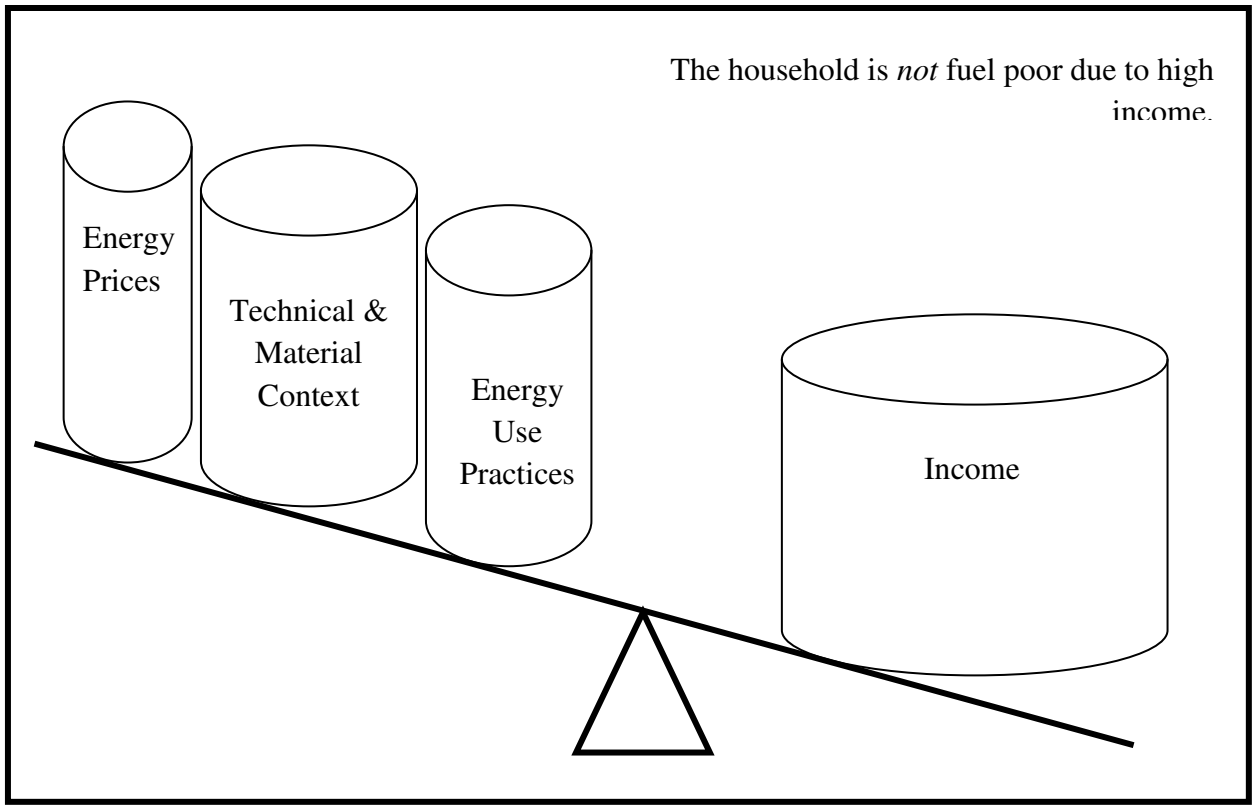
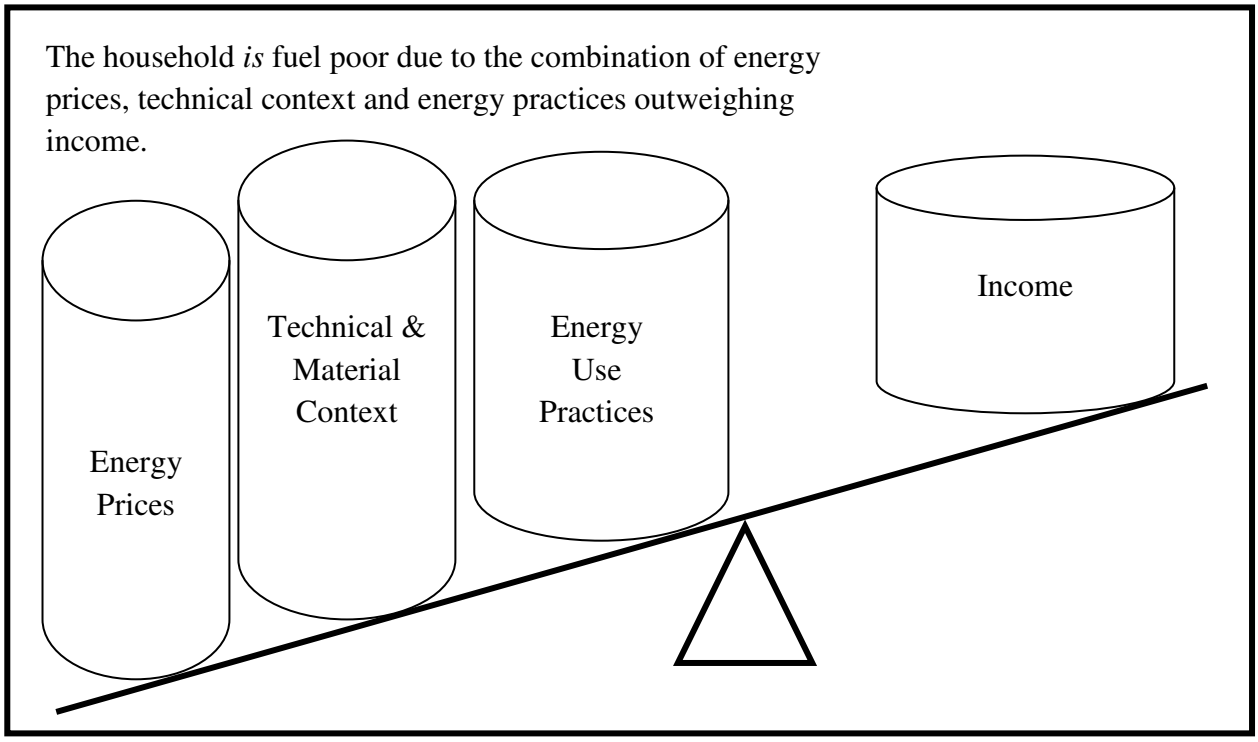


Figure 1.2



Research into fuel poverty (Harrington et al., 2005; Howieson & Hogan, 2005; Wright, 2004) has reported methodological problems in identifying the fuel poor. There are no easily observable symptoms of a fuel poor household as would be the case in a medical complaint for example. Rather there are a multitude of clues which can point to the existence of fuel poverty, but which alone are not exclusive to it. These include low indoor temperatures (23°C is the World Health Organisation's recommended temperature for living spaces, Healy & Clinch, 2002, p333), excess winter mortality or morbidity (Howieson & Hogan, 2005, p19), poor health manifested in episodes of hospitalisation (Rudge & Gichrist, 2005, p.354), reduced occupancy (Healy & Clinch 2002), fuel debt and disconnection (Boardman, 1991). Several of these symptoms are difficult to measure, and problems associated with identification and data capture are well documented in the literature. Although difficult to measure the impacts of fuel poverty are medical, financial, environmental and experiential. Medical impacts of fuel poverty are detailed by Howieson and Hogan in their study of multiple deprivation and excess winter mortality in Scotland. They detail the respiratory, cardiovascular and immune effects of prolonged exposure to cold and conclude that, "The majority of excess winter deaths are premature and essentially preventable if the elderly can be kept warm in their homes."(Howieson & Hogan, 2005, p18). Harrington et al. (2004) support these findings and go on to demonstrate that it is not only the elderly that are at risk; they show that a wide variety of individuals in their study suffered negative physiological or psychological effects as a result of living in fuel poverty.

Aside from these medical impacts, which have been extensively studied, fuel poverty has implications for domestic finances, the environment and for quality of life. The financial impacts are often fuel debt and then disconnection. Prolonged fuel debt is strongly associated with inability to pay rather than late payment (Boardman, 1991, p38) and carries the severe consequence of disconnection, which leaves an already vulnerable household with only one source of heat – human warmth. Problems associated with debt have not been covered in this review, other than where it has tangentially entered the fuel poverty texts, where it is associated with spiralling financial problems, high interest money lenders and insolvency. Environmental impacts are caused by the increased amount of energy that must be used to warm a (physically and behaviourally) inefficient household than an efficient one. The resulting increase in carbon dioxide emissions is an impact that is at the heart of this thesis's examination of attempts to address this tension through energy efficiency policy interventions in the UK. Detailed study of the interplay between greenhouse gas emissions and fuel poverty is noticeably missing from the existing literature and is an area that the 2005 Fuel Poverty Research Centre Scoping Study Report (Palmer et al., 2005) highlights for future research focus. Finally, experiential impacts are those that are felt in terms of quality of life. Harrington et al. (2005) and Healy & Clinch (2002) argue that their qualitative data provides evidence of reduced quality of life, a reduction in the living space of the home, a reduction in social activity in the home and a lack of desire to leave the home in winter.

1.2 Policy Trajectories of Domestic Energy Efficiency

While the above symptoms that are now associated with fuel poverty were recorded before the oil crises of the early 1970s, the problem did not become established as a policy issue until late in that decade (Wicks, 1978) and from then began a slow and incremental journey into the policy arena.

In the era before the oil crises, house building prioritised the avoidance of 'damp, structural instability, poor sanitation, fire risk, and lack of light and ventilation' with heat retention being largely ignored in the design and build process, unlike in other northern European nations (Boardman, 1991). Although building standards slowly began to rise in the early 1970s the OPEC led oil crisis of 1973-1975 effectively quadrupled the price of crude oil, with a knock on effect on domestic energy prices:

"Even with general inflation at 24% in 1975, the fuel price index rose by 9% in real terms. Public awareness of the price of fuel and its role in the domestic budget increased – energy costs had become headline news."

(Boardman, 1991, p19)

Bradshaw argues that this heightened awareness of the cost of domestic thermal comfort lead to the emergence of 'fuel poverty' as a policy issue (Bradshaw, 1979). Donnison (1982) suggests that housing policy had also created new problems for the vulnerable, with new forms of housing condemning individuals to suffer the impacts of increased energy prices. Those renting high rise flats built in the 1960s before thermal

standards were introduced in building regulations, were largely reliant on night storage electricity. In effect, occupants had no choice over how to heat their homes, and were at the mercy of heterogeneous, multi-scale forces beyond their own four walls; including government policy-makers, building developers, middle eastern oil cartels and the then-nationalised energy industry as well as some forces that shared their living spaces; the night storage heaters, the under floor heating, the single glazed windows, and the solid concrete walls. Importantly, domestically produced coal also rose steeply in price, meaning that those in older homes with a fireplace as the only source of heat also suffered (Boardman, 1991).

Energy consumption practices were subsequently challenged by the transition from pre-pay meters to credit metering (Boardman, 1991). From 1966 to 1976 3.9 million people changed to quarterly credit payments which fundamentally challenged both their economic and technical relationship with energy providers. Demanding new forms of budgeting, combined with an alienation from the real cost of fuel caused by the calculations required to comprehend the quarterly bills made fuel debt and disconnection a creeping, insidious problem for those unable to manage their finances in this new way. 1976 saw a record number of disconnections, 176,000 in total (Boardman, 1991, p27). Meanwhile, the Thatcher government's framing of social life as a process of rational, atomistic and economic decision making in which individuals were increasingly expected to take responsibility for their own welfare emerged as the dominant way of comprehending social and economic life in the UK, as can be seen in the conservative government's perspective on the increasing inaffordability of energy in a statement from the Secretary of State for Energy, Nigel Lawson:

"Conservation ... is a way for the consumer to cut his costs. It is unlikely in the extreme that we would be better off if decisions about insulating millions of homes... were all made in Whitehall. The government's role is neither to induce the individual to make decisions against his better judgement, nor to waste public money in subsidizing investment that is already well worthwhile."

(Department of Energy, 1982a, p.6)

With no policy aimed at affordable warmth, and the development and distribution of energy efficiency technology left to the assumed neutrality of the insulation market, it was trusted that privatised energy retail markets which were incrementally liberalized from 1988 (Waddams Price, 2005, p129) would provide the low prices that would reduce fuel bills and thus lift millions out of fuel poverty. Faith in market forces to drive down price could only be a plan for the mid-term, however, as it was not until 1996 that consumers began to enjoy the benefits of lower energy prices.

1.2.1 Institutionalisation of Fuel Poverty as a Policy Issue

During the latter part of the conservative government, policies eventually began to emerge that did address affordable warmth. The Social Security Act of 1990 introduced a grants system by which the Secretary of State could make payments to identified groups of individuals to improve the thermal insulation of dwellings to reduce wastage of energy in connection with space and water heating. This brought into being the first version of the Home Energy Efficiency Scheme, which still

survives under its new name; Warm Front. The grants were restricted to those who might be considered vulnerable, as defined by entitlement to certain passport benefits. These changes can be interpreted as being evidence of the maturation of fuel poverty as a policy issue. In addition to the development of experienced and increasingly well resourced pressure groups, a medical literature was developing to support claims that exposure to low indoor temperatures is associated with excess winter mortality (Howeisson and Hogan, 2005; Wilkinson et. al., 2001) which was supported by an increasing number of writers and activists who together forced government to address the issue from a public health perspective. Taken together these developments created a new solidity of fuel poverty's political profile which was largely built on the political work of energy charities at both the grass roots level and at national policy level and the establishment of a new science of fuel poverty, most importantly with Brenda Boardman's seminal 1991 book, *Fuel Poverty: From Cold Homes to Affordable Warmth.* The combination of mobilised lobbying organisations and a science base meant that fuel poverty could solidify as a policy issue around an overly simple but strategically useful definition which both strengthened its political profile and would go on to create problems as the policies emerged, as the thesis explores. These factors, in conjunction with the material conditions of the UK housing stock, gave fuel poverty its political birth in the UK, as the poor energy performance of the majority of UK homes amplified these political and scientific developments, and made them resonate across communities who felt firsthand the combined effects of high prices and technically inflexible dwellings and infrastructures.

It was not, however, until the Rio Earth Summit of 1992 that the environmental concerns, now associated with energy efficiency intertwined with the fuel poverty agenda, as a powerful global movement toward sustainability began to permeate government departments. In 1993 The Energy Savings Trust was formed with the explicit aim of reducing UK carbon dioxide emissions to 20% of 1990 levels by 2010. It was at this point that synergies between sustainable development and fuel poverty reduction were recognised as a political asset to those working on energy affordability. In this post-Rio context the Home Energy Conservation Act (HECA) of 1995 was created which required local energy conservation authorities to increase domestic energy efficiency by 30% by 2010, in recognition of the need to update the existing housing stock if sustainable development priorities were to be addressed. The connection of fuel poverty and climate change in the material fabric of British homes, however, meant that the HECA would, in practice, become a significant institutional anchor for fuel poverty governance. The HECA is also significant as it devolved responsibility for energy efficiency improvements to local authorities which was in keeping with the Local Agenda 21 principles but was not backed up with significant, systematic financial support to meet the 2010 target (Jones and Leach, 2000).

1.2.2 Energy Efficiency in the New Labour Era

In the New Labour era fuel poverty was for the first time explicitly acknowledged as a policy priority, and the government created a Fuel Poverty Strategy in 2001 (DEFRA, 2001) which pledged to eradicate fuel poverty from all vulnerable households by 2010 and from all households by 2016. However, if fuel poverty was growing in size as strength as a policy issue, climate change was exploding. From being described as the greatest challenge facing humanity (Blair, 2006) to the creation of a new government

department for energy and climate change in 2008, it is an issue at the centre of a vortex of governmental and discursive activity. The various policy events since 1997 are detailed in Table 1.1.

Although set in a chain of policy initiatives stretching over at least three decades, the Energy White Paper of 2003 was a particularly significant milestone in recent energy efficiency policies in the UK. Its drawing together of fuel poverty and climate change responded to the growing establishment of both fuel poverty and climate change lobbying networks and demonstrated, by embedding both issues into its four targets, that they had achieved national political importance whilst also signalling that they were inextricable related to one another. Indeed, Lovell et al. argue that in the period since 2003 Climate Change has become framed as an energy issue and that energy and climate have 'converged on the policy agenda' (Lovell et al., 2009, p90), with the most striking example being the creation of the new Department for Energy and Climate Change in October 2008. The importance of the 2003 White Paper to this analysis is that it set out a 'framework for policy development over 50 years' (DTI, 2004, p4), creating a long term strategic vision for energy in the UK and formalising what had previously been an "ad-hoc" set of energy efficiency policies (Jones and Leach, 2000). The policies associated with the 2003 White Paper are still with us in 2008 and are undergoing a process of consultative regulatory reform.

Since the publication of the White Paper in 2003, subsequent energy policy publications have further stimulated and accelerated the changes laid out in the 2003 document. The Energy Review of 2006 provided a significant opportunity for the

policies and commitments of the 2003 White Paper to be revisited but the White Paper of 2007 made more clear the government's commitment to the four objectives set out in 2003, as well as opening up new potential for nuclear power investments which, while important, are not the primary focus of this thesis. Although there is a shift in policy focus towards energy supply and away from demand, this is within the framework of the four energy challenges identified in the 2003 document, indeed by prioritising two of them, security of supply and carbon abatement through a third, freedom of markets, the fourth – fuel poverty alleviation - is marginalised. The White Paper of 2007, 'contains little that is new in terms of additional resources or measures to address fuel poverty', (NEA 2007, p2) while climate change and energy supply security are given the priority in terms of the weight of attention they are afforded in the 2007 White Paper, which "set out to address two long-term energy challenges: tackling climate change by reducing carbon dioxide emissions both within the UK and abroad; and ensuring secure, clean and affordable energy as the UK becomes increasingly dependent on imported fuel." (ACE, 2008, online). Despite their material connections, fuel poverty loses ground in the 2007 document which makes a noticeable shift in emphasis away from social equity towards environmental protection and security of supply in energy policy directions. It is in this landscape that the study is located, analysing the challenging scenarios created in the New Labour era of energy efficiency governance as they unfolded in 2006-2008.

Table 1.1 Table of relevant policies since 1997

Policy / Initiative	Year	Key Features

VAT on Domestic Fuel	1997	Incoming Labour Government reduces VAT on domestic fuel from 8% to 5%.
Winter Fuel Payments	1997	Pensioners are paid £200 to cover the costs of extra seasonal heating.
Warm Homes and Energy Conservation Act	2000	Acknowledges need for local and national fuel poverty strategies.
UK Climate Change Programme	2000	In conjunction with the Utilities Act, it establishes the Energy Efficiency Commitment, and requires energy suppliers to invest in promoting energy efficiency in the home.
Decent Home Standards	2000	'Quality and Choice: A Decent Home For All' (DETR, 2000) defined decent levels of thermal insulation, among other things, and required that all social housing meet these standards by 2010.
Home Energy Efficiency Scheme (HEES) / Warm Front	2000	The HEES is a grant programme which was later rebranded Warm Front in recognition of the partnership approach needed to deliver it. Funded by DEFRA and administered by EAGA it provides grants to households to fund domestic energy efficiency installations in the homes of eligible householders.

EU Directive on Energy Efficiency	2002	Promotes the cost effective improvement of energy efficiency in buildings, the convergence of building standards towards those member states with already high standards, and includes a methodology for calculating the energy performance of buildings. The Directive became European law in January 2006.
Energy Efficiency Commitment	2002	Requires energy retailers to create agreed levels of energy benefits for householders.
Energy White Paper, *Our Energy Future*	2003	Sets out a long term vision for energy policy around four objectives: reduced carbon dioxide, affordable energy, security of energy supply, and promotion of free markets. Sets a target of reducing UK carbon dioxide emissions by 60% by 2050.
Sustainable Energy Act	2003	Requires the Secretary of State to set aims for sustainable energy and report on progress towards them.
Winter Fuel Payment Supplements	2003	An extra £100 is paid to households containing at least one person aged 80 or over.
The Energy Act	2004	Supersedes the Sustainable Energy Act, requiring the Secretary of State to report on new energy sources and micro generation.

Housing Act	2004	The Housing Act requires Secretary of State to take reasonable measures to improve residential energy efficiency by 20% over 2000 standards by 2010.
Building Regulations	2006	The UK building regulations were modified in March 2006 to specify new, higher standards of energy efficiency, thermal insulation, ventilation and air tightness.
Energy White Paper Meeting the Energy Challenge	2007	Organised around two priorities: reducing carbon dioxide and ensuring the supply of clean and affordable energy in response to the UK's status as an energy importer.
UK Climate Change Bill	2007	Sets out targets for cuts in UK carbon emissions and makes them legally binding; it proposed an independent committee on climate change to monitor and advise on the progress towards these targets; and it called for new powers to enable the government to more easily implement emissions' policies.
Community Energy Efficiency Fund (CEEF)	2007	A new flexible fund of £7.5m is created, financed by the treasury to support the development of areas based approaches to fuel poverty.
Prime Minister's	2008	Under intense political pressure the Prime Minister announced a £1bn increase to the existing fuel poverty

Energy Deal		and carbon dioxide emissions reduction policies.
Creation of a new government Department for Energy and Climate Change (DECC).	2008	The new department will be tasked with addressing the interrelated energy challenges previously spread between DEFRA and DTI / BERR, but there is concern, rooted in early statements from the head of the department, that this new department will focus on climate change and energy security at the expense of fuel poverty.

1.3 Scope of Research

The thesis is the product of a three year research project funded by an Economic and Social Research Council (ESRC) CASE studentship, a collaboration between Durham University's Geography Department and NEA, the national fuel poverty charity. NEA works across England, Wales and Northern Ireland and with sister organisation Energy Action Scotland to develop and promote "energy efficiency services to tackle the heating and insulation problems of low-income households. Working in partnership with central and local government; with fuel utilities, housing providers and health services; and with consumer organisations, NEA aims to eradicate fuel poverty and campaigns for greater investment in energy efficiency to help those who are poor or vulnerable." (NEA, 2008). Although fuel poverty and climate change policies and practices are studied at both the national and sub-national levels the research into sub-national governance and domestic practices of energy focuses on the North of England

in particular and involved three area based studies at the local authority level. While many of the conclusions drawn throughout the thesis could be applied to Scotland, Wales and Northern Ireland, it is important to be clear that in the UK energy efficiency policies (although not energy markets and the associated Energy Efficiency Commitment) are administered by the devolved national governments, and although similar policies exist in the devolved nations to deal with their even more challenging pre-existing energy networks, the analysis is restricted to the English experience to avoid complicating matters by bringing in the politics and varied outcomes of partial devolution. Among the phenomena examined in the thesis are three national policies which are particularly important to how the UK government is attempting to structure domestic energy use, energy markets and energy governance. The thesis discusses the operation of, and interactions between, these policies and initiatives and they are outlined here.

1.3.1 Warm Front

The Warm Front Grant programme provides grant funding for individual households to install packages of insulation and heating improvements up to the value of £2,700 (or £4,000 if oil central heating is recommended) to eligible householders. It is directly government funded but managed by a contractually appointed managing agent, EAGA PLC. Warm Front is specifically aimed at the private housing sector, as only home owners or tenants of private landlords can apply. Eligibility is also restricted to households in receipt of certain benefits, meaning that the considerable funding, £800 million for the 2008 – 2011 period (DTI, 2007), an increase of 40% on 2002-2005 levels (DEFRA, Dec 2007, Online), is spent exclusively in households with some of

the lowest incomes in the country. To date the programme has resulted in the installation of energy efficiency improvements in over 1.6 million homes in England since 2000 and in 2006/7 can claim to have saved 253,079 households an average of £193.78 per year (EAGA, 2007). In terms of carbon dioxide emissions reductions, despite being a fuel poverty instrument rather than a carbon abatement tool, Warm Front is predicted to save 0.4 MtC by 2010 (DTI, 2006, p77).

1.3.2 The Decent Homes Standards

The Decent Homes Standards are a set of minimum standards, established in 2001, which apply to all social housing in the UK, and which must be met by 2010. To comply with the Decent Homes Standards a home must have reasonably modern facilities, be weatherproof and warm, and in practice failure to meet insulation requirements has been the most common reason for dwellings to fall short (FPAG, 2006). While the government argues that since 2001 it has reduced the number of indecent homes by 50% (DCLG, 2007, online), implementation has varied widely. Although some landlords have exceeded the standard (FPAG, 2006), current predictions are that the 2010 target will not be met by all social landlords (NEA, 2007). It is also felt by many practitioners working in local housing and energy settings that the minimum standards set by the Decent Homes legislation are considerably lower than it ought to have been if it is to be an effective affordable warmth measure. FPAG observe that, "*…in part because the level of energy efficiency is low in the Decent Homes Standard, as many as 46% of the fuel poor in Social Housing in 2004 lived in 'Decent Homes'. ... In order to eradicate fuel poverty in*

Social Housing, the energy efficiency levels clearly need to be raised above those in the Decent Homes Standard" (FPAG 2006, p15).

1.3.3 The Energy Efficiency Commitment (EEC)

The EEC is a statutory obligation for energy suppliers with over 50,000 customers to create set numbers of fuel standardised energy benefits by encouraging households to take up energy efficiency and low carbon measures. Energy benefits are measured in lifetime terawatt hour savings and in practical terms can either reduce bills for a given level of energy services, or can enable a higher level of energy services without higher bills. These benefits are created by deploying devices and technologies such as low energy light bulbs or insulation and is paid for by energy suppliers. The EEC operates in three year periods and the number of energy benefits that suppliers must 'commit' to creating has grown from 62TWh in 2002-2005 to 130TWh in 2005-2008 (EST, 2007) before the EEC being renamed the Carbon Emissions Reduction Target (CERT) in its third and final phase from 2008-2011. Under CERT suppliers must reduce carbon dioxide emissions rather than create energy benefits, but the total required spend has doubled from EEC2 to CERT. The EEC is described by DEFRA as "the Government's principal driver of household energy efficiency and carbon reduction."

In order to analyse these policies and the networks which they interact with in an effective and clearly defined way the following six research questions were identified to steer the field work and analysis appropriately.

1.3.4 Research Questions

The project is guided by the following research questions:

How are practices of energy conservation undertaken in households? How, and with what effect, do current policies shape attempts by householders to enhance their energy efficiency?

What attempts to better coordinate domestic energy efficiency policies and interventions have taken place at the sub-national level, and to what effect?

What are the barriers to the integration of attempts to tackle climate change and fuel poverty?

Who is responsible for domestic energy conservation, over whom, to what purpose and with what effect?

Where and what are the sites of governance and what governmental technologies are employed?

What lessons can be drawn from the fuel poverty and climate change sectors, and how can policy interventions and household practices be enhanced to promote wellbeing, quality of life and greenhouse gas emissions reductions?

1.4 Thesis Outline

Having introduced these core research concerns and questions what follows is an overview of the thesis' structure. After setting out the conceptual framework (Chapter Two) and methodological approach (Chapter Three) the thesis is organised in such a

way that the analysis starts with the experiences of householders using energy and the challenges they face and moves from there, tracing the lines of causality as they overlap and interfere with one another. By working this way, from domestic practice back into the various governmental and commercial phenomena networks the thesis gives analytic foreground to the energy user and to energy technologies and economies, rather than adopting a top down policy analysis of the national programmes. This chapter structure also effectively and systematically addresses the research questions and mirrors the way in which the field work was conducted.

1.4.1 Chapter Two

The second chapter develops the conceptual framework underpinning and guiding the fieldwork, analysis and the writing process. The chapter examines the previous studies of governance processes and suggests that contemporary energy governance is centrifugal in nature in that a small regulatory state operates by attempting to coordinate the interaction of several satellite agencies who act as intermediaries who align the interests of state and subjects to produce outcomes which are imperfect, hybrid combinations of various energy projects. It is argued that in order to understand the ways in which the state struggles to determine the outcomes of its projects and the conflicts and challenges that this creates for individuals, businesses and communities, it requires a conceptual approach which integrates the social, technical and economic aspects of governmental networks. The key conceptual theme running throughout the thesis is introduced through a discussion of the strengths, weaknesses and blind spots of currently predominant approaches to government, policy and practice including studies of policy processes, of the roles and forms of the state, science and technology

studies (STS), actor-network-theory (ANT), economic geography and theories of power, in particular those of Michel Foucault. The result of the discussion is a coherent integration of these approaches through which it is suggested that after-network theories can be seen as spatialised, post-human developments of Foucault's account of practices and power. Such approaches as those of John Law, Jonathon Murdoch and Andrew Barry are integrated with one another and with Foucault's ideas to create the conceptual spine of the thesis.

1.4.2 Chapter Three

Having established the conceptual approach taken and the rationale for its deployment, the third chapter details how this was operationalised in order to undertake the research. It explains the reasons why semi-structured interviews combined with interactive home tours were used to research everyday practices, and details the interviews and other methods used to research policy makers and energy professionals. The chapter also argues for what is felt to be the epistemological modesty but analytic and political potential of small scale qualitative studies. This style of research is still felt by many in policy circles to be inherently less powerful and less valuable than larger scale projects which prioritise breadth of sample over depth of insight, but the chapter argues that useful and practical outcomes as well as intellectual ones are possible with small qualitative studies and indeed that they should be a priority of research that seeks to engage audiences outside the academy. The techniques used to analyse the data are also discussed. In addition, the chapter gives details of what measures were taken to ensure that the findings were and are being disseminated to those who participated in the project and the professionals working in related roles that

made various contributions to the project as well as how they have been involved in reaching conclusions.

1.4.3 Chapter Four

This chapter attends to the everyday experiences of energy use, drawing on home visits to fuel rich and fuel poor households. The chapter explores the practices of energy use and the difficulties faced by individuals looking to reduce energy costs as well as carbon dioxide emissions in challenging socio-techno-economic settings. The chapter examines how and through whom individuals interact with government and how governmental discourses embedded in technologies as diverse as central heating control units and energy supply tariffs are domesticated, re-coded and plugged into everyday life. The inability of governing agencies to adequately structure the reality of energy purchase, use and waste is analysed by deconstructing commonly held notions of rationality and offering as an alternative an embodied, socio-technical and economic account of practice. In this account energy use is most often found to be the a-rational rather than irrational outcome of myriad interactions between human bodies, technical configurations and long held, resilient narratives about waste, comfort and managing the home economy.

1.4.4 Chapter Five

The second analysis chapter concentrates on the agencies responsible for aligning the energy projects of government institutions, businesses and individuals. The organisations central to the sub-national coordination and implementation of policy

objectives are theorised as niche governance entrepreneurs (NGEs) due to their commercial characteristics and the nature of the roles they play in the energy efficiency sector. The effects of relying on such agencies to perform the function of coordinating the otherwise disconnected national policies at the local level is considered through a network analysis of the connections and disconnections between actors and the discourses, technologies and economies structuring them. The logics built into the new energy economies triggered by national funding streams are shown to create inequalities of provision across time and space. An analysis of three area based studies highlights these issues, describes geographic inequality of governance provision, the two phases of existing policy coordination and informs a call for a third phase which might connect the wide range of governmental and non-governmental, local, national and international, human and non-human actors in new, more effective economic formations.

1.4.5 Chapter Six

In Chapter Six the focus of analysis is on the national policy phenomena which have structured the practices analysed in Chapters Four and Five, dealing directly with the connectedness of fuel poverty and climate change. Drawing on data from interviews with senior actors involved in the core national policy networks the chapter discusses the strategic roles of government institutions as designers of policies which attempt to actualise diagrams of low carbon and low cost energy use. The chapter goes on to examine the complex and emergent practices structured by policies designed to be coordinated, implemented and fine tuned by a wide range of non-governmental actors with the national state institutions restricting themselves to regulatory roles. The ways

in which the Energy Efficiency Commitment (EEC, now renamed the Carbon Emission Reduction Target, or CERT), in particular, is designed to be at once a market based solution to carbon reduction and to function equitably and with the ability to 'care' (Smith, 2005) for those most vulnerable to fuel poverty is focussed upon and the analysis illuminates the problems encountered when a governmental project interacts with several other socio-techno-economic arrangements and processes. The policy is found to exhibit technology bias as a result of the least cost logic of the installation markets and to alienate certain groups on the basis of their local, technical, and economic contexts.

1.4.6 Chapter Seven

The final chapter draws together the main findings from the thesis and uses them to respond directly to the research questions. The chapter makes observations about the energy efficiency governance framework in England, the relationships between climate change and fuel poverty objectives and about everyday energy use before discussing the contributions the thesis can make to theory and praxis.

This introductory chapter has laid out the aims and objectives of the thesis and provided a sense of why researching fuel poverty is both vitally important in the context of ever rising energy prices and the ever greater threat of climate change, and how it might enable some modest contributions to current understandings of the technicalities and economies of governing, an insight into why projects which attempt to organise people, things and relations are often disrupted or diverted.

Chapter Two: Developing a Conceptual Framework

2.1 Introduction

Having introduced the empirical and political context for the thesis' focus on fuel poverty and climate change abatement in the previous chapter, this chapter provides a review of academic literature and develops a conceptual framework for the thesis. The chapter contributes to existing debates by developing an analytically integrated framework which tackles the complexity of the social, technical and economic relationships of energy efficiency. This is achieved by interweaving ideas originating in several sub-disciplines within human geography and sociology.

First the chapter discusses what will be referred to as the 'governance debates', focussing in particular on the role of discourse coalitions and the processes involved in aligning overlapping policy objectives. The work of Bruno Latour, Michel Callon and John Law, or by way of theoretical short hand, Actor-Network-Theory (ANT), is then introduced to inform an analysis of the spatial practices of power and government. ANT and its conceptual legacy has theorised the agency, actancy, performativity or otherwise named capacities of things and technologies and is used here. A network analysis of government is developed through a discussion of the agency, actancy, performativity or otherwise named capacities of things and technologies which in turn

informs a spatialised and post-human application of Foucault's account of the actancy of ideas and knowledge, devices and deployments, and practices and power. This conceptual approach encourages an analysis of arrangements, of how certain states of interaction are devised and brought about and, particularly, how these socio-political processes are achieved through technical and economic means. The integration of ANT and Foucault's work on power and government attunes the thesis to the complexity of energy networks while providing a framework for an analysis of the tensions between interacting governmental and domestic practices, projects and problems.

This integration of ANT and post-Focauldian approaches is then augmented by an account of the constructedness of markets and 'The Economy'. Doing so enables the development of a coherent yet multi-faceted socio-techno-economic approach to the hybrid geographies of energy efficiency practices. The third major section of the Chapter brings these insights together to theorise the practices of energy use and governance which animate the socio-technical energy economies that the project aims to understand.

2.2 The Governance Debates, Argumentative Turn and the Centrifugal State

This section analyses how studies of governance have developed a particular understanding of government and suggests why and how they can be augmented. A growing consensus has emerged among policy and governance scholars (Rhodes, 1990; Giddens, 1998; Hajer and Wagenaar, 2003; Parker, 2007) that thinking of the

national central government as sole, sovereign governor is an outdated way of conceptualising government, and that there has been a reconfiguration of roles, responsibilities and capacities of state institutions, which have, in the main, amounted to an account of a smaller state and a bigger role for non-state actors in governing processes. The vision of government being orchestrated and administered by the nation state was popular, indeed hegemonic, in social science between the post-war period and the 1970s (Jessop, 2008). It was a time when the main drivers of policy were the provision of essential services, citizen welfare and redistribution of resources between income groups and across space and has been usefully referred to as a Keynesian mode of governing. Kickert et. al. (1997) argue that several crises in the 1960s and 1970s in Western Europe and North America meant that states began to fail to achieve their objectives, while other writers, such as Painter and Goodwin (1996), Jessop (2002, 2008), and Brenner (2002, also see Brenner and Theodore 2002) have referred to these failings as a crisis of Fordism. These challenges to the Keynesian state resulted in a "pessimistic view of the government's abilities to achieve its goals and to influence social development. Due to severe budget cuts many western governments began a strategic retreat." (Kickert et. al., 1997, P4)

A prevailing line of argument throughout the governance literature, which itself grew out of a need to theorise that 'strategic retreat', is that the state, from the 1970s and certainly by the 1980s, had suffered a reduction in its capacity to control its territory. It is important at this stage, however, to be clear that the reported reduction in capacity was accompanied by an ideological shift, with the advent of Thatcherism and Reaganism, which meant that states in very powerful ways also *chose* to delegate responsibilities and their attached capacities to other organisations, as Pierre (2000), Jessop (2008) and Brenner (2004) argue. This process of state transformation from a

large centralised manager of the economy to "a plethora of quangos, public-private partnerships, sub-contractors and not for profit organisations which the state now relies on for the delivery of services," (Parker, 2007, p114) constitutes, for many contemporary scholars of policy processes, a "governance turn" (Jordan et al., 2005, p477). This process continued until it became clear to many scholars that "Central rule in modern industrialised societies has become an anachronism. Central government is unable unilaterally to control the complexities and multiplicities and pluralistic diversity which are fundamental characteristics of modern societies."(Kickert et al., 1997, p4).

The transition was argued by some to be down to the failure of central governments to manage the economic and social crises of the 1970s (Jessop, 2008) and of the 1980s and 1990s (Pierre, 2000). This led Pierre to argue that in the wake of several economic crises in the late twentieth century nation states had to search for new ways to maintain levels of public services which were less burdensome and which allowed them to share responsibility to perform welfare functions with other organisations (Pierre, 2000, p4). This search for a more effective and efficient means of achieving state objectives would suggest that the transformation of the state recorded in the late twentieth century can be seen to be a response to both the new efficiencies made possible by market based relations and to the recognition by the government that they alone, as a calculative centre in a highly complex socio-techno-economic system, were unable to control the economies and societies of which they were sovereign. Choosing to distribute responsibility for government across other agencies created the potential for greater efficiency and speed of response, but also for even higher levels of complexity,

more unruly relationships between governmental, non-governmental and quasi-governmental agencies and reduced the capacity for policy makers to determine outcomes. This point, that outcomes of government are, at least in part, affected and redirected by agencies that are in-between the state and its subjects, is significant as it is through the analysis of the effects of the relationships between the various actors and actants involved in governing energy efficiency that the thesis is able to make a contribution to the field, as is developed below. The requirement to attune analysis to these interactions is also part of the need to develop an integrated conceptual framework which can handle the work of all kinds of actors at a variety of locations between policy design, delivery and domestication.

2.2.1 Policy Networks

Observing this greater interdependency between state institutions and societal organisations, policy scholars developed the idea of policy networks in order to conceptualise these new interactive and fragmented processes (Rhodes and Marsh, 1992; Dowding, 1995; Rhodes, 1997; Bevir and Rhodes, 2003). In contemporary usage 'policy networks' is most usefully thought of as an umbrella term for a wide range of differently imagined constellations of actions and actors involved in the policy process in different ways, what Rhodes refers to as a "buzzing, blooming confusion of terms" (Rhodes, 2003, p426). An inclusive definition is offered by Rhodes:

"As used in the analysis of British government, the term *policy network* refers to sets of formal and informal institutional linkages between governmental and other actors structured around shared interests in public policymaking and implementation. These institutions are interdependent. Policies emerge from the bargaining between the networks' members (and for a comprehensive review see Rhodes 2006). The other actors commonly include the professions, trade unions and big business." (Rhodes, 2007, p4)

A comprehensive typology of the various different ways in which policy networks have been theorised is near impossible as the literature has expanded dramatically since the early 1990s but for the purposes of this thesis, it is important to note two things.

Firstly that concentration on networks was crucial to the opening up of policy analysis to a wider range of *sources* of data and to new places to find interesting and illuminating insights into the ways in which government is performed. By studying the relationships between a variety of types of actors at a variety of scales the thesis illuminates the techniques and devices used to orchestrate the relationships between entities involved in energy efficiency. A key outcome of this change in emphasis was a change in where to look when researching policy and politics. Rather than studying only the policy documents of central state institutions and interviewing civil servants, the idea that policy processes are performed by a wide range of actors from various sectors meant that research could engage with an equally wide range of data sources in order that it might chart the ways in which power, responsibility and legitimacy are

distributed across policy networks. This opens up the thesis to consider the notion that the capacity and responsibility to coordinate fuel poverty and climate change policy may be located outside of central government departments as well as within them, or more accurately, it might be located in the relationships between the state and non-state, national and local actors, and in the relationships between their various attempts to organise energy efficiency activities. This amounts to a study of how governmental actors are working to order the world in-between scalar and institutional boundaries if the project is to avoid looking for types of statehood which no longer exist and instead focus on finding out how and why socio-techno-economic arrangements are structured.

Secondly there has been a conceptual shift that matches this empirical shift in that there are now more *types* of data that are relevant to policy analysis as there is a wider range of phenomena that are deemed to be 'acting' in the governmental process. Most noticeably, discourse became a major focus of policy analysis. This widening of empirical focus offered by the governance debates accompanied by a theoretical turn away from conceptualising power as a property of formal institutions toward seeing it as bound up with policy discourses and framings has encouraged an interpretive trend policy analysis, sometimes referred to as the 'argumentative turn' (Forrester and Fischer, 1993). Hajer (2003) makes clear the link between the idea of policy networks and the new emphasis on the linguistic: "a close practical and conceptual connection exists between a post-positivist policy analysis and today's decentred world of governance." (Hajer, 2003, P xiv). The argument made by Hajer and others (Pierre 200, 2000a; Hajer and Wagenaar, 2003) is that there is an ontological-epistemological fit between the emergent complexity of governance processes and an analytical

approach which is able to move beyond a positivist attempt to map the true nature of policy making onto a structural model of institutional government.

2.2.2 Discourse Coalitions

Within the policy networks literature then, a particularly interesting development has been the increased emphasis on the "usage of language in political life" (Hajer, 1993, p44), and a move to think of government as the "mobilisation of bias" (Hajer, 1993, p45). I agree with Hajer however in wanting to stretch this a little, and to argue that, "the real challenge ... of analysis is to find ways of combining the analysis of the discursive production of reality with the analysis of the [extradiscursive] social practices." (Hajer, 1993, p46)

Hajer offers the concept of discourse coalitions as a concept to describe a "group of actors who share a social construct," (Hajer, 1993, p46) and is right to point out that discourses, or *social constructs* as he sometimes prefers, do no 'float' in the world, rather they are anchored to actors and over time if they are successful become institutionalised in social practices. However, the institutionalisation of which Hajer speaks is a social one; he focuses on "institutionalised insights and convictions" (Hajer, 1993, p46).

This emphasis on the linguistic and the social is at the expense of what Latour calls "the missing masses" (Latour, 1992) of non-humans and quasi-humans that animate and influence and partake in processes which are too often deemed to be only social. With this in mind there are three important ways in which the approach taken in this

thesis can augment the concept of discourse coalitions. Firstly it recognises that discourse are not only anchored in social and institutional practices but also in material and technological objects and that government is not only the mobilisation of bias but also the mobilisation of technical and economic entities into new states of interaction. Of these tasks discourse construction and direction is only part. While Hajer, much later, acknowledges that discourses "congeal ... solidify in technologies and financial regimes" (Hajer, 2006, p2), he does not go far enough to provide a thoroughly socio-technical analysis of government as the non-humans in his account are conceptualised as vessels to be filled with social meanings, as if 'the social' were a separate element. Instead, this analysis will suggest, drawing on the insights of ANT, that humans and non-humans co-constitute the social and that all manner of entities can through their interactions generate, catalyse, or obstruct governmental processes.

Secondly, while Hajer argues that discourse coalitions allow us to study what happens when actors share a social construct, the research problem addressed here needs more than this. Using Hajer's vocabulary of social constructs, rather than studying what happens when several actors (both human and non-human, in light of the first point) share a social construct such as environmentalism, the example used by Hajer[4], the thesis requires an analysis of what happens when a single actor or actant shares several conflicting constructs. By this it is meant that the analysis of the attempts by governing agencies to organise entities such as houses, infrastructures, insulation markets and people's lives around governmental designs which would bring about reduced carbon

[4] Hajer does attend to the ways in which several discourses are present in environmentalism, but these are various contributing components of a larger discourse, such as the contributions of environmental and economic science to the construction of acid rain as an environmental problem.

dioxide emissions can be integrated with the analysis of how a similar process is also going to arrange the same entities around a different set of objectives designed to reduce fuel poverty.

The third way in which the thesis will develop the discourse coalition's thesis is to focus on the practices of building and maintaining coalition as well as the discursive projects which are most often theorised as holding together and structuring coalitions. So rather than think of the discourse being the glue holding the coalition together the thesis studies the *work* being done by key actors to maintain and repair coalitions.

These points are developed further in Chapter Six in particular but the contribution offered here is that analysing the heterogeneity of actors and actants, the complex social, technical and economic contexts in which they operate, will enable a critical analysis of the relationships between overlapping attempts to govern technologies, markets and people. In particular it is a response to the need to explain why governments are increasingly using contractually mediated networks of policy implementers and designers, technologies and everyday practices to turn white paper objectives into on-the-ground energy work. Critically this hinges upon two facets of governance which have been underdeveloped in the literature on, particularly environmental, governance. Firstly, as introduced above, the technologies employed to achieve the networks of power and the socio-technical arrangements with which government must interact have been largely left out of studies of governance and only partially included in Hajer's discourse coalitions. Andrew Barry's emphasis on "the centrality of technology to the reconfiguration of what one can call the space of

government" (Barry, 2001, p2) is developed later in Section two's discussion of the role of the technical in governance processes. Secondly, there needs to be an analysis of the ways in which power can be exercised across space. That is to say that the way government is achieved through myriad intermediary agents to bring about certain outcomes needs to be scrutinised.

2.2.3 Centrifugal State

Responding to this challenge, the thesis examines the process through which national policy programmes operate by creating incentives, opportunities, new potentialities and new niches which precipitate the emergence of constellations of actors and actants. In these arrangements agencies are enlisted to implement, align and combine programmes but in many ways their roles and the opportunities presented to them are defined by the national state institutions. From this perspective the state is seen to operate in localities through intermediary agencies it has enrolled into particularly constructed economic relationships. In such circumstances the state is argued to act through centrifugal rather than centripetal force (Pierre, 2000). While the thesis examines the precision and effectiveness of such a mode of governing, this view of an adapted but not necessarily weakened national government is very useful when trying to understand government in the energy efficiency sector. Pierre argues that the contemporary state "Seeks to increase its points of contact with the external environment as a means of conveying its objectives to the surrounding society. Important elements of this pursuit have been deregulation, de-concentration and decentralisation, giving local authorities, agencies and quangos opportunities to operate more closely to actors outside the political sphere." (Pierre, 2000, p242). By

using various partner agencies to align policies with local demands and to combine different local and national initiatives the national state can be seen to retain much of its formal power and use it to structure the techno-economic relationships of other agencies in the network. However, it delegates responsibility to bring about outcomes to these satellite agencies. These concepts are explored in Chapters Five and Six and the effectiveness of this mode of governing are challenged. However, the work of Michel Foucault on the technologies of government and of Bruno Latour, as well as John Allen's response to Latour's, are developed below in the following discussion in order to better understand this problem of exercising power over space through heterogeneous networks.

2.3 Foucault, ANT and Power

So far the Chapter has suggested that the governance debates have produced, in Marten Hajer's concept of 'Discourse Coalitions,' a useful tool for analysing the policy process but one which must be augmented if the government of energy efficiency is to be understood. The following section will develop this by interrogating the work and influence of Michel Foucault in order to theorise the practices of exercising power over space in order to steer networks of actors and actants toward particular, optimal states of interaction. This can be seen as a contribution to the kind of work that Hajer has called for in his argument that as social scientists we need to provide better accounts of how the discursive production of the world interacts with extra discursive realities (Hajer, 1993, p46).

Hindess explains Foucault's notion of power and government, thus characterising government as a particular structuring of relations that is effective but not equivalent to domination:

"Foucault conceives of power in terms of a 'structure of actions' (Foucault, 1982, p220) bearing on the actions of those who are free. It follows from this, in his view, power relationships will often be unstable and reversible. His conceptions of domination and government, however, are intended to designate power relationships which are relatively stable and hierarchical. Domination refers to conditions under which the subordinated have little room for manoeuvre." Government lies in between domination and those relationships which are reversible, it is the conduct of conduct." (Hindess, 1996, p97)

For Foucault, governmental power is the deployment of power by the state in order structure relations in durable, and sometimes oppressive ways. This does not however mean that the power of state institutions is of a different kind to power in the rest of society. Foucault insists that the idea that states dominate and oppress through a different, negative kind of power is "a totally insufficient conception of power", (Foucault, 2008, p154, in Hindess, 1996) and that his project is "to develop, or better, to show in which direction one could better develop an analysis of power that would not simply be a negative, juridicial conception of power but a conception of a technology of power." (Foucault, 2008, p154). Government from a Foucauldian perspective then is the effective use of power-knowledge to organise a population and

to create ways in which issues, and a very good contemporary example is energy use, are understood.

At the micro level, governmentality, Foucault's term for the mode of governing which through both rationalities and technologies of power manages the conduct of subjects (Lemke, 2001, p2), relates to the project's focus on practice and lived experiences of energy conservation in the home. It refers to the way in which subjects are led to re-structure themselves through covert appeals to their "desires, aspirations, interests and beliefs," (Dean, 1999, p11). By intertwining government with its subject, both conceptually and linguistically (government and mentality), Foucault breaks down the dichotomy of state and self, asserting that there can be no clear distinction between the two; indeed he argues that they are mutually constitutive. Technologies of government create aspects of the self which then perform government as a function of the subject. The result is that the self is an agent of governing discourses, such as neo-liberalism, in the form of the drive to consume and so forth and it becomes ever more unimaginable for the subject, the citizen, to constitute themselves in any other way (Allen, 2003). A significant point to emphasise at this stage is that Foucault encourages researchers to focus on the ways in which power is deployed and resisted at countless micro-sites of government rather than at the 'source' or the central government institutions, as Hindess argues: "In Foucault's view, then, the study of power is ... the study of the 'total structure of actions brought to bear (Foucault, 1982, p220) on the actions of others in particular cases" (Hindess, 1996, p101). That is, he encourages us to pay attention to how power is practiced, how an array of governmental technologies, linguistic, psychological and technological, are used to control interpretations and

behaviours. This focus on the "micro-physics of power" (Jessop, 2008, p65) amounts to a distinctly different approach to conventional state theory and studies of policy processes through the study of central institutions and demands the study of the dispersed, emergent and complex practices of social relations that spin out from governmental nodes. It is entirely appropriate that Foucault and others sharing his perspective stress the importance of activity, of work, and of technique; for 'government' is a verb. In the context of environmental policy, techniques used to facilitate this activity are cost benefit analysis, environmental impact assessment and future modelling (Backstrand, 2004) while in fuel poverty, calculations which create predictive relationships between excess winter deaths and gas prices are devices which can be seen as attempts to quantify and manage the interpretations of such issues and events.

While governmentality approaches suggest a way to understand the nature of the power as exercised, and the ways in which machines and materials can enable and restrict practices of government, much work in the governmentality tradition has not yet moved beyond linguistic / discursive analysis to examine that which is more than human. The problem with using governmentality alone to study energy governance is that it encourages an analysis of discourses without reference to the things and doings that they reside in and flow through, as Rutland and Aylett insist in their study of energy policy in Portland:

"While, ... governmentality offers crucial insights to our analysis, to achieve a more complete understanding of local environmental governance we also need to examine

the work entailed in developing new policies, paying close attention to how governing priorities emerge, how objects of government are constituted and how different actants are involved in establishing both." (Rutland and Aylett, 2008, p631)

The point that elements can participate in the course of action is made perhaps most simply and concisely by Latour himself:

"In addition to 'determining' and 'serving as a backdrop', things might authorize, allow, afford, encourage, permit, suggest, influence, prompt, block render possible, forbid and so on. Actor-Network-Theory is not simply the claim that objects do things 'instead' of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored." (Latour, 2005, p72).

The important contribution of ANT to the thesis is, then, that it will allow analysis to progress into territory that environmental policy researchers are only beginning to venture, as Kaljonnen suggests: "ANT offers a promising methodological tool for bridging the dualisms of nature/society and structure/action in the analysis of environmental policy" (Kaljonnen, 2005, online). What is perhaps most surprising about the above suggestion of ANT's potential from Kaljonnen is its date. Until recently ANT has not been a major part of the environmental policy analysis literature, and in its absence there has been a tendency to concentrate on either institutions or discursively configured networks. ANT is an approach which first of all moves away

from giving humans and their ideas ontological privilege and instead argues that both humans and non-humans such as, in this case, the inert matter of buildings and energy use ought to be considered as equally enrolled in the co-creation and determination of networks.

Although not necessarily using an ANT approach, studies which have developed from the science and technology studies tradition have in recent years begun to consider the combined social and material components of energy phenomena have, however, made some important contributions to understanding the society / nature relationship with regard to energy policy (see Guy and Shove, 2000; Lovell, 2005, 2007; Hegger, Van Vliet and Van Vliet, 2007; Owens and Driffill, 2008). Boardman (Boardman, 2005) notes that two thirds of the housing stock of 2050, by when total carbon dioxide emissions are hoped to be 60% lower than 1990, are already built. We live in them. We consume, dwell, sleep, breathe and invest in these materials in ways which have major impacts on our lives as individual humans, but also on our lives as a sustainable community, and our abilities to engage with new governmental and commercial initiatives. So to theorise the technological aspects of energy use is to acknowledge that it is only though an analysis of the dynamic relations between materials, such as the housing stock, utilities networks, energy technologies and so forth, and their users that energy efficiency can be adequately addressed. Doing this requires an extension and development of the very valuable insights offered by Foucault into government to make possible an interrogation of *how* governmental objectives become actualised through their effects on relationships between people, ideas and things.

This endeavour is informed by Andrew Barry's argument about the technical in relation to the social:

"The idea that a non-human device can work autonomously of its multiple connections with other (human and non human) elements (language, bodies, minds, desire, practical skills, traditions of use) is a fantasy. ... Seen in these terms techniques and devices can become political ... in the sense that technical designs and devices are bound up with the constitution of the human and the social. Any attempt to contest or challenge the social order may then involve – and probably will involve – an effort to contest the development and deployment of technology as well." (Barry, 2001, p9)

Barry's great contribution here is to notice that political futures are tied up with technological change, as Lovell also argues in her analysis of low energy housing (Lovell, 2007), making it clear that for energy challenges to be adequately addressed a proper theorisation of the interaction between people and technologies is required, and that governmental agents will very often employ technologies in steering societies and economies toward certain futures. Barry makes such a connection explicit by arguing that technologies found in every corner of our lives are, or can be, governmental and are instrumental in inducing, enforcing or themselves carrying out particular practices in line with governing discourses. These devices then become material facilitators of regimes of power-knowledge, yet regardless of the centrality of technologies and devices of discipline in Foucault's work on government and power these processes have been 'largely neglected by post-Foucauldian scholars' (Barry, 2002, p19):

"In Foucault's account government is inevitably a technical matter. Practices of government rely on an array of more or less formalised and more or less specialised technical devices from car seat belts and driving codes to dietary regimes; and from economic instruments to psychotherapy. ... In this way the study of government in Foucault's sense of the term, opens up a much broader field of politics to inspection. The political need not only be associated with the control of political institutions, the activities of the state or the formation of social movements. Instead I take the political to refer to the ways in which artefacts, activities or practices become objects of contestation." (Barry, 2001, P5, 6)

From this perspective, technologies are seen as contested components of governmental networks with significant roles to play in the development and deployment of governmental projects. Importantly however, valorising the technical is not to allow technological determinism to run unchecked for as Lovell points out, technical scripting often has far from predictable outcomes (Lovell, 2005a), as the chapter has argued that the state is only able to imprecisely determine outcomes of governing centrifugally. Lovell has used a socio-technical approach to show that materials such as building fabrics, clothes and heating systems have real and unexpected impacts on the way individuals use their homes which can often have negative as well as positive effects on energy consumption, "In practice complex, unexpected relations form between technologies and users, which can hamper the achievement of sustainability goals." (Lovell, 2005a, p15).

Hudson makes a similar and particularly important observation when attending to the division between production and consumption. He notices that when a good, rather than a service, is followed through the economy not only are the sites of production and consumption different, the space and time of the purchase are different to those of its uses. What is critical in this is that while a material good, as opposed to a service, has one identity and one value in transaction, it has many uses and many values when it is used in different spaces and times, over which the producer or retailer is more or less powerless to define. Barry also stresses the indeterminacy of technologies, and returns to Foucault's concept of resistance to describe the ways in which socio-technical interactions can generate new unexpected outcomes, "even the most bureaucratic institutions may contain practices and activities which are politically inventive" (Barry, 2001, p6). To think of resistance as simply a binary opposition to government is to underestimate it. In socio-technical analyses resistances can come from the interaction between different attempts to structure socio-techno-economic relations producing often unpredictable outcomes. "Technical connections rarely function smoothly, and, unlike railways, do not necessarily follow well defined paths." (Barry, 2001, P15). So out of designed linearity of purpose there will be deviance, out of singularity, multiplicity and in that multiplicity is the creative potential, the generative 'push of the world' that some critics, most notably Thrift (2000), have argued is missing from Actor-Network-Theory. This thesis suggests that paying attention to the ways in which competing governmental projects structure relations between actors and actants can contribute to overcoming this shortcoming by making visible and comprehensible the generative effects of these *multiple* orderings. The suggestion is to use the approach of ANT to study the practices of producing particular arrangements of human and non-human subjects.

2.3.1 Reconciling Foucault and ANT

A central argument of this conceptual chapter is that a Foucauldian understanding of power is complimentary to actor-network-theory, as Rutland and Aylett suggest: "Brought together, we argue, ANT and governmentality provide an incisive approach to questions of local environmental governance, and to broader political concerns as well." (Rutland and Aylett, 2008, p627). As suggested in the introduction, I want to suggest that both approaches encourage researchers to trace relations and circulations, and that, if nothing else, an ANT inspired network analysis can be seen as a spatialised and post-human application of Foucault's account of the actancy of ideas and knowledge, devices and deployments, practices and power.

"We don't want to confuse the cause with the effect ... That is why it is so important to maintain that power, like society, is the final result of a process, not a reservoir, a stock or a capital that will automatically provide an explanation. Power and domination have to be produced, made up." (Latour, 2005, p63).

Despite it rarely being described as an extension of Foucault's work, ANT "makes the most of the Foucauldian insight that it is not power per se that is important but the various materials, practices, discourses in which power relations are both embedded and transported." (Murdoch, 2006, p58). Crampton and Elden also point out that Foucault, in his 1978-1979 lectures emphasises that "the definition of government in no way refers to territory; one governs *things*" (Foucault, 1991, cited in Crampton and

Elden, 2008, p6). Quoting Foucault at length, they provide a valuable insight into his understanding of the relationship between humans and non-humans:

"I think it is not a matter of opposing things to men, but rather of showing that what government has to do with is not territory but, rather, a complex composed of men and things." (Foucault, 1991, cited in Crampton and Elden, 2008, p7).

This is evidence that 'things' are central to Foucault's conceptualisation of government. For Thrift, the absence of a more explicitly socio-technical approach to power and government in both Foucault's own work and in the subsequent governmentality and post-Foucauldian governance literatures constitutes a conceptual 'blindspot' (Thrift, 2008, p56). The argument being made here however is that ANT constitutes a spatial and socio-technical account of power developed from a Foucauldian conception of power, not against it. Wood agrees:

"Actor-Network-Theory (ANT) is the only comprehensive attempt to develop a post-Foucauldian understanding of power, arguing that society is always what results from the complex interactions between human, inhuman and non-human (actor-networks or collectives) rather than being a given thing or a pre-condition or indeed exclusively 'human'." (Wood, 2007, p256)

Not only does ANT offer a post-human account of power, but it draws attention to the practices of exercising power over space, and hence provides a more geographical

development of Foucault's mostly 'underplayed' insights on the geographies of power (Crampton and Elden, 2008, p6). Latour argues that power is exercised over distance through 'translation' – techniques and devices which make it do the same work in different places. In this view, power travels across distances through mediating devices and practices so that distance is more usefully thought about in terms of relational rather than geographical distance. So power does not simply appear at different places; it must be translated in order to be transported. Latour (1987, 1988) suggests that distance is compressed by the ability of a 'centre of calculation' to position itself at a node in the network through which all flows back and forth must pass, so that the territory can be known and is connected relationally.

Following this, power is exercised by enrolling groups and individuals into the network through translation devices in market places, or in the calculations which create the harmonisation of emissions rights, or the design of policies which set up the rules of the game in such a way that it becomes difficult for subjects of this enrolment to think or operate in any way other than through these devices. Notice here the similarity with the Foucauldian notion of power which controls the ways in which individuals are able to imagine ways of relating to others. In this account, the spatial presence of power in distant places is achieved by the presence of these mediating technologies, which perform the kind of conditioning that the now distant governing agencies require. In this way relations are structured in particular ways which are more or less in tune with governmental objectives in accordance with the ability of network managers to create or enrol existing mediating devices to transmit their objectives across a relational space by conditioning the ways in which individuals can relate to

one another. By focussing on this process the challenge for research then becomes conducting an ethnography of power. It requires a network analysis of the way that governmental power-knowledge moves across space, inside and outside of formal bounded territories, through relations. As Murdoch argues: “Drawing on the work of actor-network theorists, such as Callon, Latour and Law, I argue that networks must be analyzed from within; that is, we should seek to follow network builders as they weave together heterogeneous materials” (Murdoch, 1995, p731). What Latour’s account of power offers then is a call for ethnographies of how government, the verb, works through myriad practices and technologies to steer outcomes, to pay attention to how governance operates, a project highlighted as being under-researched by Bulkeley et al. (2007). Undertaking such research, however, illuminates a limitation of the concept of linear translations, as identified by Murray Li (1999 and 2007) and the ability of governmental projects to achieve their intended outcomes.

2.3.2 Alignment and Negotiation

For some working with Foucauldian and Latourian ideas, such as Rose, governmental power is seen as a means of moving power along 'lines of force' (Rose, 1999) which extend from the central political arena, or the calculative centre in Latourian terms, out into civil society and into the lives of individuals. These ‘lines of force’ are particular power relations which are thought to enable the state to govern its population from a distance, and allow the work of government to travel out from the state to the local where the dominated 'subjects' in this power relation are coerced invisibly. A tension arises however between the universality and often transnational nature of a phenomena like discourses of environmentalism and resource efficiency and the particularities and contingencies of the local phenomena, meaning that 'lines of force’ might be slowed or

diverted and the reach of governments impaired (Leigh-Starr, 1995). Murdoch develops this analysis, suggesting that local conditions slow down the process of governmentality; "The deeper the immersion in local spaces, in their complexity and contingency, the slower the process of transporting abstractions, categorizations and so on, from one place to another" (Murdoch, 2000, p507).

The ways in which power is translated as it encounters the spatial debris of localities is a central point of interest for the thesis and theorising that process is a primary objective of the approach developed in this chapter. The interaction of competing 'lines of force', the competing socio-techno-economic arrangements they seek to bring about and their more than linear effects on energy use are what the thesis focuses on. However, Murray Li's notion of alignment (1999) is drawn upon to reconsider the linearity of translation. She makes two important conceptual points of direct relevance to the thesis; she argues against the mainstream applications of governmentality and of the concept of translation deployed by many working in the after-ANT tradition. She insists that failing to address the limitations of these approaches results in policy analyses and policy practices which fail to understand and respond to the 'consistent failure' of policy programmes (1999, p301). Firstly her critique of governmentality from 1999 argues that "a Foucauldian understanding of governmentality (the attempt to constitute governable subjects) is an accurate guide to ... a project of rule, but that the actual accomplishment of rule owes as much to the understandings and practices worked out in the contingent and compromised space of cultural intimacy as it does to the imposition of development schemes and related forms of disciplinary power." (1999, p 295). In making this claim Murray Li argues that the outcomes and practices

of government are not exclusively defined by state projects and that the pragmatic compromises made by the myriad other agencies are more important than is often argued to be the case. This insight supports the more recent readings of Foucault offered by Elden and Crampton (2008) which strengthens the argument being developed here that the top-down reading of government implicit in Rose's 'Lines of Force' thesis must be integrated with an understanding of the more generative, interactive conception of power put forward by Foucault but often overlooked by governmentality scholars (Crampton and Elden, 2008). Such an approach encourages an analysis of the ways in which governed humans and non-humans and the governing are "equally enmeshed" (Herbert-Cheshire, 2003) in shaping conduct, and in which the technologies and materialities of everyday life, themselves organised around various projects from different times and places, can restrict, distort or facilitate the creation of governmental outcomes.

Ten years later, in 2008, Murray Li's second key insight builds on this argument by focussing on "the ongoing labour of bringing disparate elements together and forging connections between them" (Murray Li, 2008, p288), critiquing Rose's term translation and instead offering 'alignments' as an alternative. She argues that practicing government requires alignments to be forged and that at each stage these will necessarily alter projects in order that they can be hooked up to other practises and technical and economic contexts. Drawing on Foucault Murray Li insists that attempts to "direct conduct and intervene in social processes to produce desired outcomes and avert undesired ones" (Murray Li, 2008, p288) involve the alignment of heterogeneous elements, including discourses, materials, and institutions, and that to achieve this kind of cohesion requires compromises which allow alignments to be forged rather than

discourses passed unaltered down lines of force. Furthermore, by paying attention to the ways in which projects are, sometimes only slightly, reconfigured through the process of assembling energy networks, Murray Li enables the analysis of how governmental projects are operationalised, or "rendered technical" (p265), and failures managed. In doing so Murray Li encourages an analysis of the contested socio-techno-economic practices rather than simply the projects of government.

Bringing these insights into government together then the chapter argues that government per se is less about domination and more about 'a certain kind of vying for position, a circling of one another as action follows reaction in an effort to influence the outcome of the process – not so much as a scripted power play then, as open-ended games of power." (Allen, 2003, P78). However, in these contested networks individuals are "free to fashion themselves in all kinds of ways, yet invariably narrowing down the possibilities in line with acceptable behaviour." (Allen, 2003, P81). The ways in which the negotiations between state and other actors are narrowed and structured are interrogated in Chapters Four, Five and Six.

2.3.3 Overflowing Interventions

A critical part of such a network analysis however is to illuminate the difficulty of controlling the outcomes of such transmissions of power through space by focussing on where various attempts to organise the world interact. Other accounts of topological power, such as that presented by John Allen (2003) support this attention to the

imperfections and interactions between networks, suggesting that the translations are not always faultless; rather the arrangements produced are in many ways beyond the control of the centre. If translations are "more open than closed, less connected than is hoped for, more prone to leakages than is presumed, then power's successive reach is rather more hit and miss than controlling. 'Something always escapes', as Deleuze and Guatarri would have it" (Allen, 2003, p134).

This emphasis on that which resists or leaks out of the translations - in the form of contested practices which are beyond the prescriptions of the 'centre' - is a theme picked up in the economic sociology of Michel Callon, another key figure in the development of ANT. In his study of markets, Callon suggests that externalities and market inefficiencies might be thought of as 'overflows', pouring out of the states of interaction structured by governors. The term signals an awareness in economic theory of the problems of measuring and valuing that which runs around, beneath and across but is not 'in' the market, but it is argued here that it can be equally applied to governmental processes. The concept also recognizes that there can be no singularity in spatial activity. Action in the spatial realm is always accompanied by extra effects, often at the very periphery of vision.

"I would say that what is created outside the boundaries of the market is not something which is reducible to economic calculations, because markets create new collective identities that are not very well defined. It is impossible to take them into account without creating or setting up a space, that is a political space, in which these identities

are discussed and confronted with each other. So the consequence of overflowing is a constant (re)creation of new political spaces." (Callon, in Barry et. al., 2002, p286)

When understood to be devices for the purposes of enabling particularly configured economic relationships, markets begin to appear as devices designed to channel the world in certain ways, through certain logics in order to actualise certain objectives. Furthermore, these market based orderings do not exist as 'islands unto themselves' (Law and Mol, 2002, p11), particularly for the actors and actants involved in or alienated from the markets. John Law and Annemarie Mol argue that:

"Often it is not so much a matter of living in a single mode of ordering or of 'choosing' between them. Rather it is that we find ourselves at places where these modes join together. Somewhere in the interferences something crucial happens although a single simplification reduces complexity, at the places where different simplifications meet complexity is created, emerging where various modes of ordering ... come together and add up comfortably or in tension, or both." (Law and Mol, 2002, p11)

Learning from these insights, attempts to structure activities in energy efficiency economies can be seen as simultaneous and not mutually exclusive; practices are constructed between several narratives such as fuel poverty, carbon abatement, energy security and others. This multiplicity, the idea that the many cross currents in energy policy have different characteristics, produces the complexity of the contemporary UK

energy landscape. As John law observes: “Various ‘orderings’ ... do not always reinforce the same simplicities or impose the same silences.” (Law, 2002, p7) The contrast between this potential multiplicity and the particularity of policy goals is where some of the most important politics of policy-making are found. Analysing markets as mobilisations of politics encourages attention to be drawn to the details of market design, the ways in which market design can through networks of socio-technical association which perform the channelling of resources, benefits and costs, have powerful effects in the world. Furthermore, the multiplicity of the issues surrounding energy efficiency, and their unalterable proximity which is hard-wired through shared materials and spaces, mean that to consciously act in one way is always to act less consciously in others.

The extent to which the outcomes of governmental processes can be controlled in such contested settings must be addressed. The chapter suggests that Foucault’s notion of diagrams of power can be developed to offer a means of conceptualising this sometimes problematic, sometimes positively generative overlaying of governmental objectives by a multiplicity of governing agents from different times, places and perspectives.

2.3.4 Diagrams

Diagrams is a term Foucault uses to refer to the designs that governing agencies have for the way that social, technical and economic phenomena should interact in order that a particular outcome can be achieved. The above discussion of overflow has

suggested that this is not always a straightforward exercise due to the simultaneous presence of other attempts to determine outcomes. Foucault used the term *diagrams* to describe governmental ideals:

"(Diagrams) serve as models, tests and ongoing aims against which programs of government are evaluated and adjusted, with the continuous (but seldom attained) aspiration that reality can be made to conform to the truth of these schemes (Elden, 2001, 145-150)." (Huxley, 2007, p194).

Prozorov provides a very useful account of Foucault's notion of diagrams, arguing that they "invent and create" (Prozorov, 2007, p30) particular ways of being, ways of interacting and relating to others, suggesting that subjects are 'enfolded into a particular diagram. This takes seriously Foucault's insistence on the productivity of power.' (Prozorov, 2007). Prozorov argues that these diagrams are what the mobilisation of actors and actants in the world is organised around and focuses (as do Rose, 1996 and Dean, 1999) on how governmental diagrams of neo-liberalism or other manifestations of a more or less liberal society permeate the everyday, breaking down Rorty's public private distinction to allow the conduct of conduct (Hindess, 1996) to be productive as well as disciplinary.

Deleuze calls Foucault's diagrams 'abstract machines' (Deleuze, 1999, p30) which generate outcomes only through divergence and interaction as they become actualised, "It is not an exaggeration to say that every mechanism is a mushy mixture ... the prison

system combines in a single figure discourses and architectures, programmes and mechanisms." (Deleuze, 1999, p34). The argument made by Deleuze here is that actually existing states of interaction, such as Foucault's example of the prison system, are the hybrid results of various diagrams fusing into one another as they pass the 'technical threshold' (Deleuze, 1999, p35) and move from envisioned to actual. All of this supports the approach taken in the thesis, that is to study the ways in which various diagrams corresponding to fuel poverty and reduced carbon dioxide emissions pass this technical threshold through a heterogeneous mix of alignments to create practices of energy use and energy governance which partake of these different diagrams rather than recreate them. A crucial insight from Deleuze is that "there are as many diagrams as there are social fields." (Deleuze, 1999, p30). This points to the multiplicity of governmental diagrams which exist simultaneously and act on subjects in various ways. The plurality of diagrams and the effects of them overlaying and interacting with one another as they try to mobilise energy technologies and users around competing objectives is at the heart of the problem of energy efficiency in the UK. Fuel poverty and carbon dioxide emissions reductions constitute two separate diagrams which are simultaneously asking different things of the same subjects and trying to arrange relationships in such a way that particular but different socio-techno-economic outcomes will result. The synergies and tensions of this process are felt at points in networks where the diagrams overlap. The data presented later in the thesis examines the ways in which this can be at times catalytic, producing positive feedbacks while at other times creating overflowing outcomes.

Helpfully, Huxley draws attention to the regularity with which diagrams fail to be realised as a result of the "interconnections and interplays between thought, rationalities, practices, regulation, environment, built form and populations" (Huxley, 2008, p193) which means that rather than operating independently on the world, governmental projects are 'enmeshed in a complex matrix of rationalities and practices." (Huxley, 2008, p`93). Importantly, Huxley stresses the crucial distinction between governmental projects and their effective outcomes. By arguing that socio-techno-economic arrangements only partially embody "causal reasonings" (Huxley, 2008, p193), he reinforces the argument being made here that socio-techno-economic arrangements in their entirety can only be understood in recognition of the overlapping of independent governmental diagrams acting on the same entities. In offering this insight into Foucault's term 'diagram' Huxley supports the suggestion made earlier that top-down governmental power must encounter the heterogeneity of the world as it moves through various alignments and at each stage mix with other attempts to actualise diagrams which, when made to travel together through the same constellations of people, ideas and things, create hybrid and often unpredictable outcomes.

To be clear then, the thesis develops the often overlooked concept of diagrams by taking seriously the suggestion of Deleuze that there are as many diagrams as there are social fields and that this multiplicity of attempts to organise the world around certain objectives creates complex interactions as subjects are simultaneously exposed to several governmental diagrams from different times and places. This idea, which provides a framework for understanding the unruly nature of socio-technical relations,

for understanding how and why any attempt to structure them is diluted, diverted or deviates, is developed below.

2.4 Energy Policies or Economies?

The above account of the socio-technicality of the energy efficiency governance has suggested that technologies and materials as well as people are mobilised to actualise various governmental diagrams. This inclusion of the non-human into the analysis of government needs to be further augmented however. This section deconstructs the artificial divide between studies of society and those of 'The Economy', before suggesting that in many ways, governing energy efficiency is about governing energy economies.

In the heterogeneous mix of policy initiatives associated with energy efficiency in the UK, power is in many ways distributed between the state and various kinds of energy businesses and the market is both a central feature of the diagram of post-Fordist societies and is the preferred mode of actualising energy governance diagrams. 'The market' is then the pre-assumed mechanism of delivery and, importantly, of design, as Mitchell contends: "It is a complex, but active, choice of government to enforce its essentially market-oriented principles", (Mitchell, 2008, p6). Firstly it is important to acknowledge the ubiquity of the idea of 'the market' in policy debate where other large, powerful organisations are involved. In the context of energy efficiency these are multi-national vertically integrated energy generation and supply businesses, and large multi-national energy efficiency contractors.

The arrival of commercial organisations into policy arenas is not a new phenomenon. It is a major feature of the policy networks concept (Rhodes, 1996), and Sally Eden made such an observation in 1999 (Eden, 1999) when she described the ways in which businesses build legitimacy in policy circles in order to achieve favourable outcomes. The paper insisted, however, that, "academic analysis of environmental policy still concentrates on policy makers and, more recently, science, leaving the important business role rather neglected." (Eden, 1999, P1295). Her account of the ecological modernisation discourse, which draws attention to the incompatibility of promises to synergistically fuse economic growth and environmental commitments, functions as a critique of the political economy of institutionalised sustainable development - a critique which has grown in strength and popularity in recent years (Harvey, 1996, p174, Swyndegouw, 2006). She highlights that the state is reduced in its capacity to act outside of a particular set of choices in environmental politics, and notes the lack of radical voices or alternatives in the debate.

"[Ecological modernization] has been used by technocratic elites to appropriate and neutralise a radical discourse of environmental reform, and because its concentration on policy prescriptions leaves little room for critiquing the sub-political status quo. Indeed Mol, (1996, p314) comments that a 'number of tasks, responsibilities and incentives for restructuring are shifting from the state to the market" as part of institutional changes." (Eden, 1999, p1299)

For energy efficiency governance, it would appear that the liberalisation of energy markets and in particular the establishment of market based instruments such as the Energy Efficiency Commitment have created a now well established pattern of governance, into which new diagrams must fit. In particular, the thesis draws out the implications of government creating energy outcomes in scenarios where their capacity to act is restricted by the crucial operational functions performed by large energy businesses. Drawing attention to these processes which integrate the social, the political, the economic and the technical demands the integrated conceptual approach which can respond to and understand the multi-faceted nature of energy networks. With this in mind the chapter now examines the way that theorisations of state-society-economy relations in geography and sociology can inform the research.

2.4.1 Deconstructing 'The Economy'

In focus here are the economic flows that circulate around, through and originate from governmental processes. In economics, and even within economic geography, there has been a separation of economics from other areas of study prompting Lee to observe that "the arbitrary notion that the economic is somehow separate and autonomous, rather than constituted through multiple social relations and conceptions of value, persists." (Lee, 2006, p413). However, Hudson (2005) argues that studies of state-society-economic relations can be usefully grouped into two camps; on one hand there are structural readings which offer a critique of the management of the economy by post-Fordist governments, and on the other hand there are post-structural readings which have succeeded in critiquing the essentialising accounts of 'The Economy'. More recently, economic geography has seen the development of a debate between

writers in these sub-disciplines which, Hudson argues, has been an either-or debate, competitive rather than mutually engaging and suggests that there is considerable potential in better integrating these perspectives (Hudson, 2004, p448). It is just such an integrated approach that this chapter seeks to contribute. The following develops the argument that once it is recognised that the economy, and in particular markets, are recognised to be constructed diagrams for the organisation of people and things, it becomes necessary to analyse who is doing that organisation, what kinds of outcomes are they trying to create, and what are the factors that determine which diagrams are able to most effectively shape the relations between the subjects of these processes.

2.4.2 Structural Readings of the State – Economy Relation

While the governance debates discussed above have considered the rise of non-state actors in managing a society, several scholars have remained focussed on theorising the state, and in particular its role in managing the economy. This different emphasis reflects the political heritage of theories of the state and its relationship with territorially bounded capitalist economies, and in particular their development from engagements with the régulation school, whose the fundamental starting point was to answer "the old Marxist question of how, ... capitalism can continue to expand for relatively long periods. It stresses that economic activities are socially embedded and socially regularized and that stable economic expansion depends on specific social modes of economic regulation that complement the role of the market forces in guiding capitalist development." (Jessop, 2008, P24) Regulation theory was used to analyse the activity of states as managers of the economies of national, and sometimes sub-national, territories. The Régulation School, which refers to a group of researchers

from the Centre for Mathematical Economic Forecasting Studies (CEPREMAP) in Paris in the 1970s and the subsequent use of their ideas by critical economic geographers, began with the observation that capitalist economies were not self regulating systems which achieved optimum economic efficiency as a result of the built in logic of market based exchange (Aglietta, 2000). Instead, the Régulation scholars argued that such economies need to be produced and re-produced by a mode of régulation which involves the state, private organisations, social practices and norms becoming attuned to one another in a functional system of interrelation.

This approach has been developed considerably since the 1990s by economic and political geographers keen to understand the way that state institutions interact with the economy in the era after the 'crisis of Fordism' (Macleod and Goodwin, 1999). Although often associated with mapping relations between institutions in quite structural accounts of state-economy interaction, the ideas originating from the régulation school can provide an important contribution to the view of contemporary energy network governance as they can, at least, inform an analysis of the role of states in defining, creating and regulating patterns of activity which most of the actors involved think of as markets but which, as is investigated below, have additional characteristics built into them. In particular, the idea that the state remains a strong actor in, rather than above or outside, the economy, and that the state is able to act as a powerful manager of political and economic networks, yet is not an all-powerful sovereign authority, complements developments in the governance debates which have suggested that the state, although smaller in scope and functional remit, retains a network management role. The re-valorisation of the state, and in particular the local

state, in contemporary, 'actually-existing' capitalist economies is a significant feature of the work that the regulation school has inspired (see Brenner and Theodore 2002, 2002a) and is an important way in which this thesis can contribute to studies of governance.

The political significance of understanding the state to be a resilient, adaptable and still powerful agent is amplified when markets are understood to be socially constructed rather than naturally occurring. If we regard markets not as guided by a universal and unchanging capitalist logic but as complex systems calibrated to achieve a particular set of socio-techno-economic arrangements in which people and technologies interact in certain ways in certain spaces which are deemed to be optimum, then illuminating the ways in which they are constructed to do so becomes important. To do so is to reveal not only the diagrams from which actually existing markets are derived, but also the practices which are performed by myriad agencies to bring about situations which favour certain groups and marginalise others, and which make certain outcomes far more likely than others.

2.4.3 Post-Structural Readings of Culture – Economy Relations

The following discussion of post-structural economic geographies seeks to make two important contributions to the chapter's development of a conceptual framework. Firstly it will add strength the argument that the analyses of the economy must be integrated with studies of other social and governmental phenomena in order to understand the hybrid geographies of energy efficiency. Secondly, it will illuminate the

ways in which markets are constructed, that they can be constructed differently in different contexts, and that when viewed in this light they need not always be the essentially regressive, normatively disagreeable devices they are often presented to be in essentialising accounts of neo-liberalism. This insight creates the potential for new, differently configured diagrams around which the socio-techno-economic relationships of energy efficiency might be arranged.

Firstly then, Lee's most fundamental point in his account of the *Ordinary Economy* is that, "the economy is more complex than disciplinary thinking allows. It is an integral part of everyday life...," (Lee, 2006, 414). This is a sentiment which can often be found across much of the recent 'cultural economy' literature, which takes as its starting point a critique of the disciplinary isolationism of Economics, the academic discipline; "The business of economic analysis has become associated not with just one discipline, but with one part of one discipline. Economics, and in particular neo-classical economics, rules the roost." (Amin and Thrift, 2004, px) By attacking the tendency to regard economic phenomena as naturally occurring in a separate sphere called 'the economy', within which the rules of neo-classical economics structure all interactions, writers in the cultural economy literature have shown 'the economy' to be poorly explained by Economics (Leyshon, Lee, Williams, 2003) and have opened up the analysis of economic phenomena to a wider range of methods and conceptual starting points. Ignoring the complexity economic phenomena and their endless entanglement with social, cultural and technical phenomena, it is contended that it seriously limits the scope of enquiry and would ultimately lead to an overly simplified

account of, for this thesis, the processes involved in governing energy efficiency in the UK.

A particular aspect of the cultural economy literature is the way it connects the economy to the concepts of power and practice already discussed above. The ways in which individuals are disciplined into performances of self interested consumers through the marketisation of ever more aspects of their lives informs the thesis' analysis of energy consumption practices. An example of this kind of work can be found in Flint's account of Ethopolitics (Rose, 1999; 2001) in UK housing (Flint, 2003), which argues that housing policy makers and policy networks are actively using economic phenomena, such as marketing messages, particular contractual arrangements and so forth to create citizens able to operate as envisaged in the liberal diagrams of socio-economic life of governing agencies:

"In post-welfare regimes of the social, citizenship becomes conditional upon conduct, understood through acts of consumption. Such citizenship becomes linked to markets (Saunders 1990; Lash and Urry 1994) as subjects constitute themselves as citizens by their ability to consume goods and services (Isin and Wood 1999; Rose 1996b)." (Flint, 2003, p614)

Economic logics, then, can be used as governmental devices which invoke particular kinds of practices. So through economic instruments state institutions or other governing agencies can attempt to bring about particular outcomes in which

relationships are well attuned to, and suggestive of, certain ways of buying, thinking about and using energy.

Secondly, a series of insights from Donald Mackenzie, Andrew Slater and Michel Callon, among others, have highlighted 'the utter constructedness of apparently pure economic entities like markets." (Amin and Thrift, 2004, px). In *The Laws of Markets* Callon deconstructs 'the economy', and in particular 'the market' in a similar way to that in which the state is treated by Foucault, as Slater argues:

"[for Callon] Economics [the academic discipline] is not a set of falsifiable claims about the economy, or an ideological construction of the economy, but rather a participant in its construction. This makes huge sense in terms of the diffusion of neo-liberalism through virtually every social institution over the last twenty years, with very real effects on the marketization, and consequent abstraction, of social relationships. As in governmentality, ... such economic discourses... operate not as directives but as reconfigurations of subjectivity as practised." (Slater, 2002, p245)

When regarding the economy as "a dispersal of discourses and practices that, in this case, involves everything from academic theory and ideology, through policies enunciated across a wide range of agencies, down to the logics informing the most mundane economic practices" (Slater, 2002, p425) it becomes apparent that these discourses and practices are constructed, which changes the way they can be analysed. Instead of performing economic analyses to find inefficiencies in existing systems so

that they might be better attuned to perform more like a perfect market, Slater, Callon, Mackenzie and others encourage researchers to examine the myths and framings which underpin our currently existing markets and which set the conditions for possible behaviour within these normalised arrangements.

2.4.4 And Not Or

At this point it becomes clear why Hudson is keen to integrate structural and post-structural readings of economic geographies. More explicitly, once we accept the constructedness of markets and their social origins and we are also aware that various state and non-state institutions are actively 'managing' the economy we can see that those institutions are in many ways constructing the economy and the myths surrounding it. This perspective, in which powerful actors are instrumental in producing energy efficiency outcomes through the socio-techno-economic manipulation of subjectivities of people and capacities of things, avoids the either-or debate that Hudson is keen to overcome and integrates insights from both the key insights of the Foucauldian approach and the Actor-Network approach to provide a comprehensive approach to the study of energy efficiency challenges faced in the UK.

These ideas about the constructedness of markets link interestingly to Brenner's account of economies being a state of 'incessant regulation' (Brenner, 2004, p304), and Hudson's own insistence that economic spaces must be produced and re-produced (Hudson, 2005). Not only are economies socially constructed systems which infiltrate the everyday everywhere, they are managed by large organisations at the national level

by policy makers who act in rather strategic ways to produce, repair and manipulate them. The strategic nature of policy and market design is returned to in Chapter Six where it becomes a focal point for the analysis of the governance process.

As suggested above, reconciling an account of governing agencies' roles in constructing economies with understandings of their effects in spatially, culturally and technically variable contexts is both theoretically possible and politically promising. That relations between governmental organisations, commercial actors and individuals are both media through which governing, steering or disciplining is achieved means that the outcomes of interactions between previously existing patterns creates the possibility that they could also be otherwise, as Hudson suggests: "As structures do not exist independently of human action and understanding but are always immanent, contingently reproduced, they are in principle changeable. This is a key theoretical point and - potentially - one of immense political importance." (Hudson, 2005, P463)

This allows us to reconsider what markets actually are, as their structural characteristics are actually the outcomes of the complex practices contained within them, which in turn are shaped by the way they structure actions. The idea that markets operate in preset, archetypal ways must be reconsidered in such a way that they are no longer deemed to be inevitably morally vacuous and in opposition to caring welfare states. Rather markets might be able to care if they are constructed and regulated in appropriate ways (Smith, 2005). Smith's argument that "Embedded in the performativity of markets is a key to revising them," (Smith, 2005, p5) leads to the conclusion that potential for change, the 'openness' of markets, rests upon the way that

economic arrangements are the co-ordinated performances of an array of heterogeneous components who more or less consciously agree to interact with one another in ways which the others can relate to. This invites the thesis to join Smith and others (See Callon, 1998; Peck, 2004; Hudson, 2005; Mackenzie, 2006) in, "questioning the economic essence and presumed singularity", (Smith, 2005, p5) of markets. This makes it "possible to imagine how, in the 21st century, a different set of values – around a caring society underpinned by a welfare philosophy – could be compatible with the workings of the diverse set of institutions and organisations currently labelled 'markets.' (Smith, 2005, p17)

What this offers for analysis of energy efficiency governance is a more nuanced approach to markets and market based policy responses. In this light it becomes possible to think that markets have in their power to enrol actors and actants of all kinds into coordinated interaction, and the potential to produce new, fairer diagrams. As Saarenen (2003) suggests of Foucault's governmentality; power produces. Taking this idea seriously and using it to analyse the ways in which everyday life is produced through interactions between overlapping strategic projects, technologies and already embedded ways of living, the chapter considers how to theorise practice.

2.5 Theorising Practice

The everyday is something we do, somehow. That 'somehow' is particularly impressive in its capacity to perform normality in day to day situations, to adapt to novelty and to coordinate arrays of machines, people, ideas as well as large scale

systems of infrastructure as well as meaning and interpretation into more or less coherent life styles, or ways of living and using energy. How and why humans do the things they do with energy in the home is a key question for the thesis, and understanding the processes which propel people onwards into their hugely varied interactions with energy discourses, technologies and economies will require an analysis the heterogeneous mix of people, infrastructures such as wires and pipes, pieces of 'kit', media messages and so forth that populate everyday life. These technologies transport and in many cases translate certain regimes into ones that householders can engage with. For example, the pre-payment meter takes the power of the energy retailer to set prices, reclaim debts and control payment terms into the home and enrols the user into their energy network in quite tightly defined terms by the way it can be calibrated to recover debt, the way it needs to be fed coins or other pre-paid currencies (such as a fuel direct card) rather than permit credit, and the way its meter provides the visual warning of how close to self-disconnection a household is at any time of the night or day. These technologies provoke, enable, steer or even script individuals into ways of using energy in powerful, but not always predictable, ways. So then, what is happening when we use energy to heat and light our homes?

Studies of energy use practices have tended to focus on the role of discourse and knowledge in shaping these practices. Shove et al. argue that the ways in which energy use practices are influenced by technologies and the built environment has been under analysed in previous accounts of energy use and environmental behaviour:

"For reasons which have to do with historic and contemporary divisions of intellectual labour, analysis of the hardware of consumer culture and its role in the reproduction of social practice repeatedly falls between the cracks of disciplinary inquiry." (Shove et al., 2007, P2)

The aim of Shove et al. is to "show how things are implicated in the development, persistence and disappearance of patterns and practices of everyday life." (Shove et al., 2007, p3). Previous studies of the material things that populate our world have tended to theorise them as representations, vessels which transport, or sedimentations of social relations and discursive phenomena. Shove et al. suggest that analysis ought to go beyond this to think about not only the things in our social lives, but also the social lives of things (Shove et al., 2007, p4). What this means is that rather than think of technologies as carriers of ideas and discourses into homes, it is more appropriate to think of them as facilitators of certain activities and inhibitors of others. Importantly however, the fact that domestic technologies are simultaneously engaged with many governmental diagrams they become contested materialities, making any particular inscription that designers of policies and technologies might try to embed into them be at least partially re-scripted by the presence of other attempts to provoke other practices. This allows us to consider the generative capacity of the relationships that things create with humans, their potential to bring about confused and multiplicitous energy use patterns due to the other orderings present at their many points of use. Latour and others in the post-ANT traditions have begun to make such a project possible:

"The great importance of technology studies to the social sciences is to have shown, for instance, how many features of the former society, durability, expansion, scale, mobility, were actually due to the capacity of artefacts to construct, literally and not metaphorically, social order … They are not 'reflecting' it, as if the 'reflected' society existed somewhere else and was made of some other stuff. They are a large part the stuff out of which socialness is made. (Latour, 2000, p113, p6)" (cited in Shove et al.)

The work of Latour, Callon and others illuminates the ways in which relations between people and between people, ideas and things can be hardwired, prescribed, directed, facilitated, steered, structured, diverted, blocked or guided by objects. Taken together, these approaches illuminate how things and people have combined capacities that neither would have without the other.

2.5.1 Practice as Socio-Techno-Economic Entity

Focussing on what practice is, Shove et al. (2007), drawing on the work of Schatzki (Schatzki, 1996), describe practice as a coordinated entity, which consists of a relationship between people and the things they do and the things they do them with and which is the fundamental entity of social life, the phenomenon through which institutions, actions, and structures are constituted (Schatzkti, 1996, p11).

Shove et al. describe practice as a fragile entity which, although able to endure over time, is dependent of the presence of other constituents. So "*practices cannot be reduced to just what people do. Equally there is no such thing as 'just doing'. Instead,*

doings are... shaped by and constitutive of the complex relations – of materials, knowledges, norms, meanings, and so on – which comprise the practice-as-entity. Practice theory therefore decentres the central objects of dominant social theories – minds, texts and conversations – 'simultaneously it shifts bodily movements, things, practical knowledge and routine to the centre of its vocabulary' (Reckwitz, 2002, p259)." (Shove et al., 2007, p14).

What this leads to is an embodied, materialised theory of practice, in which what people do is the product of what they habitually as well as intentionally do in interaction with the things they do them with and the spaces in which they are done. What this account of collaboratively achieved practice means for the chapter is that when individuals engage with ideas of self sufficiency and energy independence, they are investing in a constructed product, whether a discursive regime or an energy efficient device, that allows them to *do* things differently. They are taking part in the actualisation of a particular diagram which will make certain ways of using energy more likely. Having certain technologies at one's disposal thus enables different doings, and it is with a vision of doing certain things in certain ways and in relation to other networks of supply and discipline that products such as wood burning stoves, micro-generation technologies are often bought. While Shove et al. (2007) admit that this is a rather prosaic conclusion, it means that it becomes appropriate to think differently about market and governmental engagements:

"Rather than acquiring or aspiring to possess products for their own sake, people wanted things in order to furnish and equip themselves with what they took to be the

defining ingredients of an effective configuration. … The practicalities of doing even simple tasks, like cooking a meal, generally involve the *active orchestration of an array of material artefacts. In making dinner, multiple things have to be brought together in a spatially and temporally structured arrangement*" (Shove et al., 2007, p147)

Two points come from this. Firstly, objects only have effect in relation to one another, as in the relation between hammers and nails, or between coal and matches. Secondly, 'effective configurations are necessarily composed of meanings and competences, not of material objects alone." (Shove et al., 2007, P147). Consequently effective configurations of energy rationalities, technologies and emergent practices ought to be recognised to be hybrid entities – constituted by heterogeneous components. Furthermore, the above discussion of the everyday economies of energy use needs to be incorporated into this account. Doing so means factoring in the economic consequences, restraints and drivers that are tied to each socio-technical engagement. It enables the analysis to consider how practices need not only orchestrate an array of humans and non-humans, but also how they are structured by financial realities which enable, constrain and structure outcomes as powerfully as the brute indifference of materialities or the coercive effects of discourse. With this in mind practices are argued to be thoroughly socio-techno-economic, and agency to be a distributed property of such collective entities rather than the discreet properties of individuals or objects.

2.6 Socio-Technical Energy Economies

"Over the last few years, in response to climate change, the UK government has produced a range of policies to stimulate the development of sustainable energy technologies. (UCL, 2007, Mitchell and Woodman, 2007) These policies have been founded on market-based prescriptions coupled, where there are obvious market failings, with regulatory mechanisms. Together, these policies seek to use competitive pressures to drive specific areas of technology ahead."

(Mitchell, 2008, p1)

The chapter has argued that to study government, is to study the technical and the economic as well as the social. In tracing governance relations it becomes apparent that energy efficiency policy is inescapably a matter of matter. That is, relations are very often between or mediated by various materials and technologies (Mitchell, 2008). This attention to the technical is central to the energy challenges facing the UK and recent research into the socio-technicality of energy (see Mitchell, 2008, Lovell, 2005) complements the recent flourishing of post-human and relational geography (Castree, 2002; Castree and Nash, 2004, Braun, 2005), permitting into the analysis that which is non-linguistic and inanimate but which remains interactive and effective. Barry argues that Science and Technology Studies (STS) is a niche field in which political scientists have dabbled only lightly and which, it has been thought, has little to contribute to the development of understandings of the political. STS has generated sociologies of science and technology, but the reverse has not been pursued; research has not focused on how more adequately theorising society – technology relations

might contribute to mainstream policy / political studies (Barry, 2001). That this lacuna is now being addressed by a growing number of sociologists and geographers studying the socio-technical nature of energy governance is discussed below. With similar emphasis on the technicality of structuring relations, Callon envisions a market to be a, "co-ordinated set of heterogeneous actors which interact more or less successfully to develop, produce, distribute and diffuse methods for generating goods and services." (Callon, 1991, p133). If the word 'energy' was inserted into this quotation between 'generating' and 'goods' then it would, in many ways, be a useful way to conceptualise the contemporary mode of policy design and delivery in the energy sector in the UK. That is, energy policy processes are very heavily involved with creating particular arrays of energy goods, services, and technologies as well as appropriate ways for people to buy, sell and use them. Without theorising the material and technical elements of policy, the contextual complexity of energy policy making and regulation is seriously under acknowledged. The approach taken in this thesis can augment these insights by emphasising that not only are energy economies performed by a heterogeneous collection of entities, but their design is an act of centrifugal governmental work. The thesis analyses energy efficiency from the understanding that a market is a strategically structured means of manipulating relationships between people and products in order to actualise a particular diagram for the domestic energy efficiency field. The thesis will not only draw attention to this purposivity of energy efficiency economies but also to the skills and techniques deployed by governing agencies in trying to bring about these arrangements.

Drawing on these insights, the thesis focuses on techno-economic phenomena at work in domestic energy efficiency politics. The structuring of practices by energy policy and product designers and the materialities and intermediary agencies through which they operate makes attending to the contestation embedded in technologies and noticing their roles in determining the possibilities, opportunities and challenges of domestic energy efficiency key challenges for energy research. This is a challenge that has only recently begun to be addressed. Pioneering work by Guy and Shove (2000), Lovell (2007), Darby (2008), Owens and Driffill (2008) Smith and Kearn (2009), Houwing, Heijnen and Bouwmans (2009) and Walker and Cass (2007) among others has responded to the challenge of theorising the socio-technical nature of energy and fuel poverty governance and this thesis seeks to contribute to this growing body of literature. In particular, the thesis offers insights into the effects of interactions between governmental projects when they are technically and economically co-present by virtue of the diagrams they attempt to actualise being tied to shared, durable materialities or to economic configurations which structure flows of money and energy in sometimes synergistic but sometimes conflicting ways, with considerable effects for the fuel poor and for the environment.

2.7 Conclusions

The chapter has suggested that the analysis of energy governance inescapably requires becoming attuned to the generative capacities of relationships between components within networks and those between networks which share material constituents. By developing a framework which takes Focauldian ideas about power and government as

its starting point and augmenting these by insisting that such power is practiced spatially through the creation and subsequent repair of unruly socio-techno-economic arrangements, the chapter develops a framework which is able to afford adequate attention to the non-human, the spatial and the economic qualities of the social. It enables analysis to scrutinise the ways in which practices at various sites are structured and aligned in order to connect domestic energy use with the growing energy efficiency economy and governmental energy diagrams, as is developed in Chapters Four and Five. In addition the chapter has argued that governance in the UK energy efficiency sector can be thought of as 'centrifugal' in nature, with powerful state institutions operating by enlisting other agencies to perform the work necessary to actualise their diagrams of low carbon, affordable domestic energy.

The chapter has also suggested that thesis' post-structural perspective on the economic aspects of energy policy also provides the insight that markets, and the other economic politico-economic systems studied in the thesis, are arrangements produced by strategic framings and material capacities and qualities which interact to structure practices. Crucially, understanding them in this way opens up the potential for them to be differently designed and deployed. The framework also permits a thorough analysis of why so often economies *are* so often exploitative and structured in ways which are disadvantageous to the most vulnerable and to the environment as Chapter Six explores.

Building on this, the chapter has developed a conceptualisation of practices as socio-techno-economic entities. This has significant consequences for how everyday energy

use is understood, for how such practices might be reconfigured and through whom, as Chapter Four explores. Before engaging with the data, however, Chapter Three considers how the conceptual framework developed here is used to research the issues associated with affordable and sustainable domestic energy and how national policies and economies infiltrate the everyday.

Chapter 3: Methodological Discussion

3.1 Introduction

This chapter details the field work carried out over the course of the PhD project, and thus informs the reader of the empirical basis for the following analytic chapters. It outlines a rationale for the approach taken to researching the issues raised in Chapters One and Two and explains how the conceptual framework is developed into a research project. After detailing the field work undertaken with various participant groups in three study areas and in national settings the chapter progresses to explain how analysis was performed, how various risks were managed and how the ethical considerations were handled.

3.2 Rationale

The research project was designed to respond effectively to the research questions set out in Chapter One, while also being mindful of existing literature and debates regarding policy relevant academic research, and research into energy efficiency in particular. While the Fuel Poverty Research Centre Scoping Study Report (Palmer et. al., 2005) stresses the need for large scale numerical data, it also acknowledges a need for more qualitative data to be collected about the previously hidden domestic experiences of living in inefficient homes. This kind of qualitative insight was also

highlighted as being an area that has been insufficiently explored in discussions with the research team at NEA. In addition to this, Smith and Easterlow (Smith and Easterlow, 2004) highlight the potential of tapping into lay experiences of the home to uncover the various different ways policy and discourse are interpreted and acted upon. With this in mind, the project seeks to understand the ways in which energy is used on an everyday basis by householders, what challenges they face and what kinds of things affect energy use practices. In particular, the project examines the ways in which attempts to reduce carbon dioxide emissions from the home interact with attempts to keep the costs of energy use within affordable limits.

The project has not however sought to find the fundamental truth of people's energy use decisions, or to fully represent the hidden spaces of domestic decision making as clearly, accurately and definitively as possible. To try to do so would be to cling to the centuries old and now almost century dead enlightenment ontology of the singular, knowable world (Davies and Dwyer, 2007). The end of naive realism is widely accepted in human geography, and in its place is a landscape of mixed methodological approaches, none of which are able to make a claim to absolute truth, as Denzin suggests:

"The days of naive realism and naive positivism are over. In their place stand critical and historical realism, and various versions of relativism. … Today, 'no single, unchallenged paradigm has been established for deciding what does and what does not comprise valid, useful, and significant knowledge.' (Bochner 2000, p. 268)
Furthermore, it is impossible to fix a single standard for deciding what is good or bad,

or right; there are only multiple standards, temporary criteria, momentary resting places (p. 269)."

(Denzin, 2003, P246)

In trying to design a research project that could respond to this post-positivist epistemology lead to a question which Jon Law asks in his book *After Method*; "How to move away from the legislations that we usually find in the text books on method? Away from the completed and closed accounts of method?" (Law, 2004, p143). The need to do so comes from the rejection of neo-Cartesian perspectivism in social science which still sees the world as a single reality to be known with more or less accuracy. Instead, when adopting an understanding of the world as "an unformed but generative flux of forces and relations that work to produce particular realities," (Law, 2004, p7) research design becomes a process of creating new ways to think about how issues such as climate change and fuel poverty are created, enacted and sustained and how they have disciplining and structuring effects on socio-techno-economic relations. Based on the conceptual framework developed in Chapter Two and this epistemological position, the challenge for researchers is to trace the associations between heterogeneous components of energy networks in order to illuminate the forces which shape energy issues, and to draw attention to the politics inside what might otherwise be understood to be natural or unambiguous phenomena therein. Doing so requires becoming attuned to the ways in which people engage with each other, energy systems, economies and various institutions and to create methods which will pick up on these practices. In doing so, however, we must be aware of the techniques and technologies employed, and acknowledge that we are *performing*

research, albeit in a different way and as such, our methods can only create data which record certain enactments, not essences:

"Of course there is no essential self or private, or real self behind the public self. There are only different selves, different performances, different ways of being a gendered person in a social situation. These performances are based on different narrative and interpretive practices. These practices give the self and the person a sense of grounding, or narrative coherence (Gubrium and Holstein, 1998). There is no inner or deep self that is accessed by the interview or narrative method. There are only different interpretive (and performative) versions of who the person is."

(Denzin, 2001, P28/29)

In thinking of methods as props, cues, elicitations and recordings of different kinds of performance, one is forced to accept that practises are always multiplicitous; they are always one version (Mol, 2000) of a person's reality that is conjured into existence at the moment of its performance. So the intention is not to access some essential self in engagements with participants, rather it is to elicit a performance, and it is on these terms that the data is analysed. Denzin's reflexive interviews, for example, create new versions of participant experiences, jarred into existence by the enactment of the interview. Similarly Crang points to the photo elicitation technique of Harper (Harper, 2003 cited in Crang, 2005) who uses photographs to tempt and prod participants into action and enactment. These techniques form part of a suite of far from outlandish methods which are in tune with the approach taken in this project.

3.2.1 Mixed Methods

The use of mixed methods can be thought of as a way of "using several methodological strategies to link aspects of different sociological perspectives, not to discover undisputable facts or construct an all-encompassing theory about a single social reality." (Miller and Fox, 2004, p36) Many accounts of research methodologies use the term 'triangulation' to describe the use of several methods to build a wider, broader, more reliable account of the reality being studied. While 'triangulation' is a term steeped in representative, realist ontology its use in contemporary social science is not necessarily as code for a perspectivist approach to the field. For many, it is used to refer to a pragmatic methodological approach in which several methods are used in order to benefit from their various strengths and through their combination reduce vulnerability to the weaknesses of any one method (Bryman, 2004). Crucially, such an approach does not constitute an attempt to use several such axes to plot the coordinates of the 'real'. Indeed, in their 2007 review of qualitative methods in human geography Davies and Dwyer reported that the singular epistemological approach was increasingly giving way to more pluralistic accounts of the world:

"In place of the pursuit of certainty in generating representations of the world, there is recognition that the world is so textured as to our capacity to understand it, and thus to accede that social science methodologies and forms of knowing will be characterized as much by openness, reflexivity and recursivity as by categorization, conclusion and closure." (Davies and Dwyer, 2007, p258)

In this vein, Richardson and St Pierre suggest that a more appropriate metaphor than 'triangulation' for contemporary qualitative research is the 'crystal' (Richardson and St Pierre, 2000, p934). Its many faces refract the social into many colours, directions and intensities, opening up and creating multiple accounts of the world. Whichever metaphor is preferred, a common understanding in these approaches is that research needs to explore the plurality of energy experiences and processes rather than pin down a single fixed reality. Of particular interest is Miller and Fox's (2004) suggestion that research designs that are sensitive to these pluralities can enable discourse and ethnographic analysis to be bridged, yet not mixed. The mixing of embodied practices, discourses and the lives of technologies and economies is a central part of the challenge of this thesis, so developing a methodological approach attuned to the pluralities of socio-techno-economic relations is essential. In order to study socio-technical worlds of energy use and governance by tracing associations between policies, homes, bodies and economies, neither ethnography nor discourse analysis alone would be sufficient. It is suggested that the research questions' focus on how responsibility, coordination and government are performed in the energy efficiency sector requires no less than a network analysis of energy efficiency governance. Because of the socio-techno-economic nature of the power relations discussed in Chapter 2, the project needs to be able to follow a heterogeneous collection of entities as they interface.

As suggested in the previous chapter, such a rigorous network analysis, which traces the relations through which power is exercised, is too complicated, too demanding a

challenge as each field of governance, each ordering, creates a never ending stream of circulating and ever escaping relations which are connected by being embroiled with shared spaces, technologies and other entities. Murdoch described the network analysis demanded by actor-network-theory thus:

"Network analysis is quite simple: it means following networks all the way along their length; there is no need to step outside the networks for all the qualities of spatial construction and configuration of interest will be found therein (Latour, 1991a). ... The role of the analyst is, therefore, to follow the actor-networks as they stretch through space and time, localizing and globalizing along the way." (Murdoch, 1997, p332 and 335)

This is a valuable and powerful call to conduct research in a particular way which does not draw false distinctions between humans and non-humans, between scales or between the powerful and the powerless. However valuable it may be, it is argued here that it is not a realistically achievable task as there are too many relations, connections and events happening for researchers to be able to follow them all. As Law points out, research that is attuned to the complexity and multiplicity of the world proceeds by, "..ignoring most of the events ... and attending to and building upon very specific patterns." (Law, 2004, p107) Once it is accepted that this is inevitable, that tracing every relation or documenting every event is a practical impossibility, it then becomes a political matter of choosing exactly which ones to study. The decision taken in this project is that the most politically important and most conceptually interesting phenomena to study are the spaces and places where attempts to organise the world run

into or away from one another. This requires detecting the several projects and diagrams which attempt to organise the finite collection of materialities that they share – humans, homes, technologies, infrastructures - and will open up and make visible ways in which the everyday practices of energy use and energy governance are contested, drawing attention to the obstacles and opportunities to creating more socially, *as well as* environmentally, beneficial futures.

3,3 Operationalisation

The project used a suite of qualitative methods which together allow for a deep and rich engagement with energy use and governance. The intellectual rationale for this is set out above but it is also felt that a qualitative approach suits the practical resources, both human and financial, available to the project. In addition, qualitative work is identified as being required to access areas that previous fuel poverty research has not reached such as the experiences of fuel rich households, experiences of fuel-debt and the relationships between discourses, policy and domestic technologies (Palmer et. al., July 2005). In particular, the research was designed to be able to unimagine the often constructed separation of policy making, technology and lived experience and to draw attention to the multi-directional flows that circulate between these realms. The methods used to operationalize this are outlined below.

3.3.1 Outline of Research

The research studied two groups of participants; individual householders and energy use professionals employed or in business in the energy efficiency sector in local or national settings.

The householder research was sub-divided into two phases, the first of which featured area studies from the north of England and the selection of the areas is detailed below. For this first phase participants were recruited by actively finding, choosing and persuading people to make valuable contributions to the project. While a variety of ages, incomes, tenures, households types, and home construction types were selected in order to add variety and juxtaposition it was not the intention to use a representative sample of energy users in the north of England. Instead, people were sought who might help create a more multi-dimensional understanding of energy use. Finding the hard to reach, very vulnerable people is a problem in fuel poverty intervention (NEA, 2005) and it was, in practice, most productive to work through third party practitioners to gain access to this priority group. Similarly, contacting fuel rich, or non-vulnerable groups was equally challenging and resulted in using networks of colleagues and stakeholders to identify wards in the three areas in which a wide range of high and low income households could be found. By speaking to local authority staff in each area wards were identified where it was likely to find such variety and letters of invitation to participate were sent to targeted sub areas within the wards. The wards selected are detailed in Table 3.1.

Table 3.1: Wards Selected for Inclusion in Householder Research

Area	Wards
Eden District	Ullswater, Dacre, Penrith East
Kirklees Metropolitan Borough	Greenheads, Newsome, Cleckheaton
Newcastle Upon Tyne	North Heaton, South Heaton

Contact details for the chosen wards were purchased from the respective Local Authority's edited electoral register, and letters were sent to randomly selected homes in the chosen wards which explained the rationale and methodology for the project and what involvement would require. A copy of the letter can be found in the Methodological Appendix. In total 500 letters were sent out which resulted in 13 participants agreeing to take part in the research. The further 8 households who took part in the first phase of home visits were recruited through local organisations including The Scouts Association and a Registered Social Landlord. These organisations were used so that young families were included in the research as it was noticed that such households had not responded to the initial letters of invitation. This resulted in a total of 21 participants for phase one of the householder research. Table 3.2 details the composition of this group of participants.

Among the characteristics shown in the table is income. Respondents were asked whether they would describe their combined household income as being below £20,000, between £20,000 and £40,000 or above £40,000. These three categories

correspond to the high, medium and low income groups in Tables 3.2 and 3.3. This was used to determine income, but, as discussed above, fuel poverty is a function of more than income alone. To determine whether a household was fuel poor or not, a judgement was made which took into account the household's income, the thermal performance of the home, the heating system and billing arrangements. These were discussed sensitively over the course of the home visits in order to avoid forcing the participants to categorise themselves as fuel poor.

Table 3.2

	Tenure
Private Home owner	14
Living in Rented Accommodation	7
	Household Type
Married or Cohabiting Couple	9
Single Person	7
Multi-generational	5
	Age
Working Age	11
Pensionable Age	10
	Income
High Income	1

Middle Income	5
Low Income	15
	Insulated Property
Not Possible	7
Not Insulated	1
Part Insulated	2
Fully Insulated	11
	Building Type
Terraced	8
Purpose Built Apartment	1
Semi-detached	6
Detached	6
	Infrastructure
Off Gas Grid	3
Gas Connected	18

The participants for the second phase of the householder research were recruited as part of a related research project (see Sims-Williams et. al., 2008) into the potential energy saving benefits of a shower flow regulation device. In this research qualified energy efficiency surveyors measured the baseline shower flow rate from a group of households who agreed to participate in the project after being invited to do so at the point of their application for a Warm Front grant. This group of households were

surveyed by a professional market research agency (SMS Marketing) and consisted of a combination of previous Warm Front grant recipients and of homes managed by social housing provider Gentoo. These homes were pre-selected on the basis of: (a) having mains pressure hot-water systems feeding their shower (primarily via combi-boilers); and (b) being willing to participate in the research. The selection methods meant that the households were on low incomes and had engaged with either the Warm Front grant programme or had benefitted from the interaction between the government's two other major energy efficiency programmes: the Decent Homes Standards and the Energy Efficiency Commitment. Table 3.3 details the composition of this group of respondents. Shower flow rates were measured with and without a shower regulator fitted and respondents recorded showering time and frequency during one week periods with and without a regulator fitted.

Table 3.3

	Tenure
Private Home Owner	5
Living in Rented Accommodation	15
	Household Type
Married or Cohabiting Couple	9
Single Person	7
Multi-generational	4
	Age
Working Age	10

Pensionable Age	10
	Income
High Income	0
Middle Income	2
Low Income	18
	Insulated Property
Not Possible	0
Not Insulated	0
Part Insulated	0
Fully Insulated	20
	Building Type
Terraced	13
Purpose-built Apartment	0
Semi-detached	7
Detached	0
	Infrastructure
Off Gas Grid	0
Gas Connected	20

At the conclusion of the measurements, a subset of the homes which participated in the showering time measurements were revisited in order to conduct more detailed interviews with residents. These interviews provided an opportunity to understand the practices of energy use and energy awareness around showering in particular as well the other aspects of the household visits from the first phase of visits.

That only 13 households agreed to take part in the research as a result of the letter was disappointing as those that did respond included a wide range of home energy systems, building types, energy supply, payment arrangements, and socio-economic backgrounds. The networking activities with local agencies provided a further 8 participant households which were also varied in composition and provided a balance of home owners and renters. The second phase of recruitment, however, while useful in adding to the size of the research population and providing an opportunity for a second 'round' of research, introduced a more homogeneous group of participant households who were more similar to one another in terms of energy system, payment arrangements and socio-economic backgrounds than the participants in the first phase. These households were also all, to some degree, engaged with governance agencies and had accessed the Warm Front programme. This was useful in that it provided an opportunity to talk about Warm Front, but it also meant that there was no chance of this recruitment method finding the most marginalised households, i.e. those considered 'hard to reach' in fuel poverty discourse. In contrast, a small number of the households who responded to the letter were entirely disengaged from government for various reasons, as is discussed in Chapter Four.

3.3.2 Methods and Techniques

The householder research was designed with research questions four, five and six. A total of 41 home visits were conducted, with 21 in-depth home visits carried out in the first phase of the householder research, 7 in each of the 3 areas. These were in depth, at least 1 hour long, visits to homes and included a semi-structured interview and a home energy tour of the various heating, lighting, and insulation technologies present. The visits used both informal discussion and objects such as the heating system components to stimulate conversations which could move through the discursive, economic and technical aspects of energy use practices by bringing televisions, newspapers, letters, thermostats, fireplaces, woodsheds, coal stores, oil tanks, friends and family members into interaction during the visit. The presence of these among other objects in the home made for wide ranging, multi-scalar conversations and created rich data for analysis.

Secondly, a further 20 shorter home visits were carried out which asked a different set of questions, focussing in particular on how individuals used energy through a particular application – their shower. This research was carried out alongside the separate piece of research into shower use detailed above that was carried out in homes in the north of England by Durham University. The households were asked to record their shower use in a shower time diary for five days before and after the installation of a water saving device before I conducted an in-depth interview and home energy tour which, as in the first phase of home visits, explored the relationships between the individuals and their bathing, lighting, insulation and heating technologies. Working collaboratively with the shower project not only offered a valuable insight into

commercial research practice and the value of its outcomes for all stakeholders, which ultimately lead to the re-design of the device, but it also provided an opportunity to capitalise on the effects of keeping shower use diaries and records. Having been involved in a two week long research project the participants were focussed on the shower and its energy and water use characteristics and had become attuned to issues of energy costs and carbon emissions reductions so these visits offered a lens through which to study the interaction between energy use practices, discourses and technologies.

The data collected in the two phases of householder research, while different in context, did not lead to significantly different research activities or findings. Instead, the second phase of research consolidated the patterns and themes emerging in the first phase. The second phase provided an opportunity to 'sense check' the preliminary analyses and interpretations of the first phase while remaining open to different themes, but no new themes or interpretations emerged at this stage. It is felt that the participants in the second phase, all being in insulated homes with gas fired central heating, presented no new experiences which challenged the earlier phase but that they contributed to the research by consolidating and confirming the validity of the first phase of householder research.

3.3.3 Interview Technique

In both phases of the householder research the interviews were combined with the home tours to provide in-depth qualitative data about the lived experiences of energy

use, and participants were asked to *'show me their home*' (Jacobs, 2006), focussing on how the home is used to maintain warmth, cooling and comfort, how fuel costs are managed through interpretation of the bills and through the use of the heating systems, appliances and so forth. Jacobs suggests that getting close to the 'things', the technologies in the home, will provide access to this most valuable data and she uses this methodology to study experiences of living in high rise dwellings in Glasgow. It was often found that in an interview in the sitting room people were unable to vocalize their use of technologies but when, minutes later they were standing next to an appliance or other item and their hand moved to use it they 'remembered' or were triggered to tell something about their physical interaction with it. This approach of observation and discussion in context rather than recollection and storytelling is also used by other researchers trying to pay attention to the relations between humans and non-humans (Latour 1987; Kaljonen, 2005). The kinds of responses elicited by this technique, which included individuals showing me how they would light a fire, clean out the hearth, collect, chop and store wood, programme their heating control device, monitor their energy use with a prepayment meter, were felt to be closer to everyday practices and habits than those which might have come from interviews alone. The socio-technical practices elicited in the sessions were structured by the interactions between the users, the technology, the cultural understandings held by the former and embedded in the latter and as a result the home visits created data which were to some extent of a socio-technical nature.

3.4 Energy Efficiency Network Professionals

A second research population provided an alternative lens through which to refract energy efficiency; energy efficiency professionals from national and local government institutions, businesses, charities and other local actors were identified and invited to contribute to the project. Interviewees were selected to provide a plurality of perspectives from various 'places' in UK energy efficiency governance and they included local authority representatives, business owners, NGO staff and senior civil servants. These individuals were accessed through existing networks of contacts built up in conjunction with NEA, and a co-written letter from Durham University and NEA to selected individuals was very effective in recruiting both well placed and very valuable local practitioners as well as national policy 'elites' who held senior positions in government departments, energy retailer businesses, as well as advisory and lobbying organisations. As well as talking about policies, important elements of the conversations were the technical and economic aspects for their energy efficiency challenges and their various solutions, which meant that the research could integrate the technical with the political by observing the impacts, constraints and possibilities that technologies offered governmental actors.

While semi-structured interviews were established as the core data capture method for this population, it is also important to stress that participant observation at conferences, local forums, meetings and other such events were very valuable parts of the research process and were incorporated into the analysis to allow a study of the interaction of the actors, the ways in which tension, agreement, opportunities and obstacles were encountered and sometimes overcome. It proved to be a particularly effective way to

observe and learn about the processes such as meetings and conferences which were arranged to decode and translate new policy initiatives and entire new governance landscapes into locally meaningful, implementable solutions and the value of the work of the many actors at work in the energy efficiency governance field. Access to these events was gained by using NEA' contacts to introduce the researcher to policy circles, but also by developing a network of personal contacts who, over the course of the project, become increasingly willing to grant access to conferences, forums, workshops and even some otherwise private council meetings.

3.5 Area Studies

In order to study the ways in which the national policies played out in different local socio-techno-economic governance contexts it was decided that three area studies would be conducted. As the north of England has higher concentrations of fuel poverty than other areas of England it was decided to choose three areas from this part of England. Also, while Scotland faces higher levels of fuel poverty than England, and Northern Ireland higher still (DSDNI, 2004, p9), the devolution of housing policy to the devolved administrations meant that including Scottish or Northern Irish areas in the research would be problematic for analysis. For these reasons six potential areas were identified for consideration: Newcastle upon Tyne, Gateshead, and The Eden District in Cumbria, North Yorkshire, Kirklees & Calderdale and Greater Manchester. The selection process included thinking about the roles of the local authority, NGOs, voluntary and commercial organisations in each area, the role of the RDA or regional level actors and the presence or absence of energy efficiency networks that might link

these institutions. In addition it was decided that choosing areas in different regions would make any future comparative use of the data more fruitful. Furthermore it was felt that selecting case studies which might allow the research to engage with participants across a wide variety of social and technical variables, such as income, age, home construction type, access to gas network etc. would benefit analysis and research outcomes. Scoping studies of each of these areas were conducted, examining each possible area which led to the conclusion that Newcastle Upon Tyne, Kirklees, and Eden Valley held the most potential as study areas. This allowed the project to spread its reach across lines of tenure, income, age, health, property construction and maintenance, while the three areas are in three different English regions and have different governance structures. The details of each area and the reasons for its inclusion in the project are set out below.

Rather than studying each area in a block before moving on to the next it was decided that the seasons would have to structure the field work to allow interviews and home visits to be carried out in the winter months in all three areas, so that the research could study the practices of using energy for space and water heating when it was coldest. This meant that both phases of the householder research were carried out in all three areas between November and March 2006-2007, with energy network practitioner research conducted in the following spring.

3.5.1 Newcastle Upon Tyne

Newcastle Upon Tyne is a medium sized city with a population of 259,536 (ONS, 2001), in the north east of England. It is a Metropolitan Borough of the ceremonial county of Tyne and Wear, and is governed by the City Council. The City Council has a dedicated Energy Centre which has been established since the 1980s, and provides an inter-departmental energy management and advice service to the Council, local registered social landlords, and to the city's residents. The Energy Centre, in its Energy Strategy of 2006, stated that it aspires '*to make Newcastle Upon Tyne Europe's first carbon neutral city by reducing and offsetting our carbon emissions, motivated by the desire to minimise the city's impact on global warming*," (NCC, 2006, preface) while the same document states the council's aim to ensure that all City residents can afford to heat their homes. The inclusion of both climate change and fuel poverty objectives in the work of the Energy Centre makes the city an interesting place in which to study energy efficiency government. The City Council's approach to energy is multifaceted and tackling energy is explicitly seen as a way to improve social conditions and quality of life, to reduce the city's environmental impact through reducing the emission of greenhouse gases, and as a way to stimulate the local economy through creating more disposable income as a result of reduced fuel bills, reducing the costs of dealing with the health impacts of fuel poverty and by creating jobs in energy technology and supply industries. Studying how these objectives are operationalised and what effects they have for local energy actors, businesses and residents meant that a study of Newcastle could make a significant contribution to the thesis. In addition the presence of an unusually high number of energy efficiency organisations, such as NEA (the

CASE partner for this project), EAGA PLC as well as regional energy networks combine to create a relatively data rich research environment.

3.5.2 Kirklees Metropolitan Borough

Kirklees Metropolitan Borough is a unitary borough in West Yorkshire, with a population of 388,567 (ONS, 2001) in the county of West Yorkshire, which still exists in law as a ceremonial metropolitan county. The borough is dominated by Huddersfield, the UK's largest town, and Dewsbury, another large post-industrial town. The council has been a pioneer in environmentally focussed energy projects, guided by its 2025 'Environment Vision', and Aalborg Commitments which stress the importance of climate change mitigation. Kirklees is seen as a leading council in the sustainable energy field, having implemented the largest domestic solar power installation in the UK, SunCities, and has been ranked second only to London in the list of 'best performing council in green issues' in the Guardian newspaper (The Guardian, June 3, 2007). Within the council's Environment Unit environmental conservation is a major theme, and within that theme affordable warmth is a growing agenda, with the council publishing its Affordable Warmth Strategy in 2007, and launching its first dedicated affordable warmth project, it's Warm Zone in the same year. This increased breadth of remit for the Environment Unit from specifically environmentally attuned energy work to fuel poverty work, which is mirrored in the staffing and funding arrangements within the council, provided a valuable opportunity to observe a council in transition and the arrival of fuel poverty as a policy issue in a locality.

3.5.3 Eden Valley, Cumbria

The Eden District is a district of the county of Cumbria in north west England with a population of 49,777 (ONS, 2001). Named after the River Eden which meanders through it, the district is situated between the North Pennines and the Lake District fells. The district is made up of several small towns, with Penrith acting as a centre for local government. Between the towns are many small villages and large rural expanses which include many old properties in remote locations far from domestic energy infrastructures. All towns other than Penrith are considered to be 'rural sparse' or 'rural less sparse' under DEFRA's definition of rurality (EDC, 2008, online). In stark contrast to Newcastle and Kirklees, there is only a small county level sustainable development team and resources available for work on energy and the environment are often employed in energy generation projects, in particular managing debates over large scale wind and nuclear power. The District does not have a dedicated energy or fuel poverty resource yet faces several particularly problematic energy issues such as old rural buildings, many of which are off the gas network and are of non-typical construction. Other private and voluntary actors in the county are involved in governing energy efficiency in a variety of public private partnerships, all of which makes the Eden District an interesting site in which to study how domestic energy is managed in different settings to those found in the two more urban and better resourced areas.

3.5.4 Comparison

Table 3.4 provides a comparative look at the three areas, providing some key information which helped to select a balanced and interesting set of study areas.

Table 3.4 Comparison of the chosen three studies areas

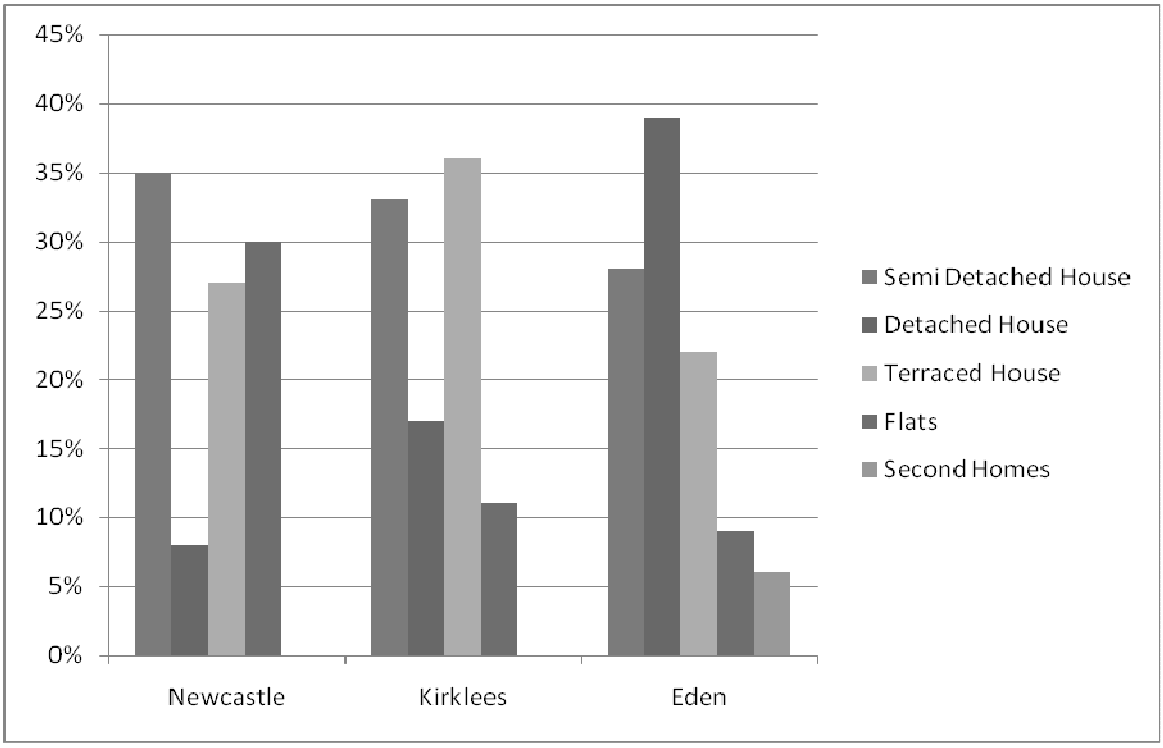
	Newcastle Upon Tyne	Kirklees	Eden Valley
Policy coordination model	There is an active Warm Zone.	There is a Warm Zone currently being developed.	There is no Warm Zone.
Local authority profile	The local authority is active on energy efficiency	The local authority has been active in pioneering low carbon energy technology and only recently on fuel poverty.	The local authority is relatively inactive in energy efficiency.

	Newcastle Upon Tyne	Kirklees	Eden Valley
Local NGO sector	There are active regional and local energy efficiency players; Sustaine, Energy North East, NEA, EAGA, EST.	The Private / NGO energy efficiency sector is smaller and activity has been more focussed on carbon emissions reduction; Local Energy Support Programme, EST, Titanic Mill project, presence of a major, regionally important energy services businesses.	Local NGOs are few in regard to energy efficiency, but these few have had significant impacts in the area; LA21, CCEAC.
Urban - Rural	The area is an urban area of national importance and is a regional capital.	The area is metropolitan but is not a major urban area and is typified by large towns.	The area is rural with no major urban centre.

	Newcastle Upon Tyne	Kirklees	Eden Valley
Characteristics	The area has a variety of income, construction types, and social backgrounds.	Construction types, incomes, and ages are mixed.	Construction types are particularly varied and properties off the gas network were available for inclusion in the project. New build properties and socially rented housing is also available to provide adequate contrast. Incomes are lower than in the urban and semi-urban areas which, combined with high land value and old, large, detached rural buildings, create particularly precarious conditions in regard to fuel poverty.

Furthermore, because of the intention to study the actancy of the fabric of energy networks and energy use contexts, the distinctive differences found between the forms of dwellings in the three areas make them especially interesting research sites, as Figure 3.1 displays (based on data from ONS, 2001).

Figure 3.1 Dwelling Types in Study Areas.



The 2001 census recorded that the most common form of housing in the Newcastle area was semi-detached (34.8%), with terraced housing accounting for 27.8% and Flats accounting for 30%, while only 7.6% of dwellings were detached. In comparison in the same year in Kirklees there was more terraced housing than any other type, accounting for 36% of all homes, with semi-detached properties making up 33%, while detached houses and flats / apartments / maisonettes accounted for 17% and 11% respectively.

In contrast with both of these areas, in the Eden District in 2001 39% of all homes were detached or cottages, while only 22% were terraced. 28% were semi-detached and only 9% were flats or apartments, but interestingly, 6% of all homes were second homes or holiday lets. These contrasting pictures demonstrate the very different material settings in each of the areas and enable comparisons of the ways in which governmental projects unfold in materially different locations.

3.6 Managing Risks

The nature of the field work meant that while the usual risks associated with travelling around the UK to attend conferences, meetings and interviews were present there were also other risks associated with carrying out home visits as a lone researcher inside the homes of strangers which had to be taken seriously. Not only was there a higher risk to personal safety when inside the home of a stranger, but the situation also created a vulnerability to accusations of professional misconduct. In order to manage these risks an assessment was conducted and a protocol for safe working practices was established which involved setting up pre-arranged times to make check-in calls to nominated colleagues who were given instructions to follow in the event that these calls were not received. The procedure and check-in form are provided in the Methodological Appendix.

3.7 Ethical Considerations

For Law (2004) the process of research is a process of method assemblage, where the work of research creates its own reality; researchers both detect and amplify realities

acting as signal processors manipulating, compressing, gating, limiting and expanding signals from one source and relaying them into a new existence. Law reflects on method assemblage, and our role in creating it thus:

"As a part of making and condensing realities, method assemblages necessarily craft complexities and simplifications.... They work by ignoring most of the events that make up the laboratory, and attending to and building upon very specific patterns of events. The general lesson is that to enact out-therenesses is to make silences and non-realities as well as signals and realities."

(Law, 2004, p107)

This creative role for the researcher, the idea that we create new versions of the world based on the circulations between our world and the multiple worlds of policy and practice, suggests that the most important decision facing researchers is not how best to capture the truth of the real, but what to pay attention to, what to include or exclude, and what narratives to construct. This is fundamentally an ethical and political dilemma, one which Law and Mol call the 'ontological politics of social science' (Mol, 1999). The project's approach leads to the study of contestation, tension and relationships in domestic energy efficiency, rather than looking for its essential truth, and hence the ethics of its knowledge production are similarly contested. This is especially so in light of the policy and practitioner audiences that the project engages with, as Demeritt and Lees suggest is a critical political dimension of CASE studentships (Demeritt and Lees, 2005).

In adopting qualitative methods, and making lay experiences part of the core body of data, the project recognises and values the diversity in the way knowledges are crafted out of experience, ideas and power and from interactions between people and their more-than-human contexts. One aspect of the project which demands sensitivity and reflexivity perhaps more than others is the extent to which this is a critical research project. Several angles of critical positioning are present among the actors in the field, including the stated aim of the CASE partner, and co-sponsor, to bring about a particular political outcome, which is predicated on judgements about distributive justice and equity. The positioning of the thesis is consequently a politically sensitive issue, particularly in light of the wider aims for CASE studentships to be immediately relevant (Demeritt and Lees, 2005, p127) to issues such as, in this case, energy policy. In addition, the sense that the research topic is so lively a political issue, with over 4 million UK households in Fuel Poverty in 2008 and approximately 30,000 excess winter deaths annually (NEA, 2008; Energywatch, 2008), means that 'the field' with which the research is engaged is politically sensitive, and much is at stake. Negotiating the pressures from other groups and individuals with whom the research engaged, the CASE partner and other stakeholders and participants, has meant that these voices are not only to be regarded as data in the field, but also stakeholders in project management. Bearing all of these issues in mind and considering that the balance of existing academic research into energy efficiency has focussed on carbon dioxide emissions reduction it was felt that this project should instead focus on fuel poverty, and the effects of various attempts to reduce carbon dioxide emissions from domestic properties on the fuel poor.

A second issue is that the research area uses emotive terminology such as: poverty, wealth, warmth, health. These bring with them connotations which may lead to individuals being made to feel that they have been singled out as poor or unhealthy. This causes problems for the usefulness of their responses in that they may give socially desirable responses rather than honest ones, as Bryman (2004) identifies as a problem with researching sensitive issues such as domestic finances, but it also forces one to consider how the individual will be affected by being involved in the research. While every effort was made to minimise negative impacts and to use language sensitively, the difficulty of controlling such responses is such that this issue had to be given constant attention throughout the field work and dissemination.

Finally, the research explored domestic practice and, as such, it engaged with sensitive issues such as power dynamics in the home, health, and hardship. Evidence of issues such as bullying, domestic conflict, financial problems or ill health were not found to be directly or indirectly present in the data but due to their relation to some of the issues discussed it was important to prepare for such an event in order that it could be handled in a professional and ethical manner. Other than these issues it was not felt that the project involved ethical dilemmas, which is unusual for qualitative research of this kind.

3.8 Analysis

The data used for analysis were the transcripts of the semi-structured interviews with both householders and energy professionals, although experiences of visiting the homes and the offices and other workplaces of the participants as well as notes made from participant observation at the many meetings and conferences (detailed in the Methodological Appendix) also informed the analysis. Data analysis was performed using HyperResearch qualitative data management software in order to facilitate fast, reliable and efficient coding, cross referencing and the iterative reading and re-reading of texts and photographs. This involved developing a coding framework which was iteratively modified as the analysis progressed and ideas about what kinds of stories emerged from the data. As Carabine explains, qualitative analysis is a process of "*interpretation (which) becomes more finely tuned and nuanced as the analysis develops."* (Carabine, 2003: 283).

The coding framework was developed by considering the research questions and reflecting on what kinds of themes had emerged over the course of the project and which spoke most directly to the research questions. This can usefully be thought of as an approach influenced by, but not restricted to, the Grounded Theory of Strauss (Strauss, 1987). By working with the data and an understanding of the wider conceptual and empirical contexts a sense of how the data can be put to work in responding imaginatively and fairly to the research questions was developed and then refined through several readings of the texts. The process of analysis involved the researcher undertaking not only formal coding, but also in a process of "*working and re-working (and re-re-working) drafts.*" (Crang, 2003, p130). Crang emphasises that

"*Analysis is not simply an issue of developing an idea and writing it up. Rather, it is thinking by writing that tends to reveal the flaws, the contradictions in out ideas, forcing us to look, to analyse in different ways and rethink.*" (Crang, 2003, p130) It follows that while the coding carried out in HyperResearch made a significant contribution to the analytical process, the analysis has continued right through writing, indeed up until submission, as drafts of chapters and the thesis as a whole have been reconsidered in an iterative relationship between the data, the questions and the conceptual development.

Just as the energy realities being studied have many simultaneous but heterogeneous associations, so do the texts created. They are multi-scalar and ontologically heterogeneous in that they assemble a wide range of things (a list could include heating technologies, habits, knowledge, discourses…) from many different places, such as the body, the home and the international political economies of energy. Being sensitive to the many phenomena gathered in each text allows the research to investigate contestation and internal struggles woven through the interview transcripts, as Fairclough suggests:

"The working assumption is that texts ... mix different discourses, though this is a matter of degree (Bakhtin, 1986). Some texts are more 'hybrid' than others and tendencies to lesser or greater hybridity depend on social and historical circumstances."

(Fairclough, 2003: 241)

Fairclough develops the notion of the 'hybridity' of texts based on the co-presence of several discursive tropes within a single text. That textual hybridity might be extended to include the ontological hybridity established in Chapter 2 and above, so that not only different discourses can be considered to be present in a text, but different types of things are also relationally present. This permits analysis of texts to operate topologically, meaning that analysis of policy documents and interview transcripts can reach into the actancy of technologies and materialities as well as words and people by becoming attuned to the impacts of these technologies on the diagrams being textualised in the documents.

3.8.1 Dissemination

Disseminating the findings of the research to participants and others beyond the academy was important for two reasons; analytic and ethical-political. Firstly, the analysis process included learning from dissemination sessions and incorporating the feedback from practitioners into the re-writing process outlines above. Secondly, being funded by a CASE studentship and because the project benefited so much from the participation of energy and governance professionals, it was felt that being fair to the participants would mean communicating the findings to them and their colleagues to avoid alienating them from the research they had been part of, and to provide an opportunity to challenge interpretations of the data. This ethical commitment to effective dissemination also had a political aspect in the sense that Law and Mol (2002) use the term. Disseminating findings is to take part in the onto-political process

of creating energy futures and it was felt that there was a duty to engage with actors both within and beyond the academy given that the aim of CASE studentships, and policy-relevant research more widely, is to inform and challenge those in the policy process.

In addition, the findings of the research have been disseminated to international academic audiences in order to establish links with others in the field and to contribute to the development of the debates surrounding the new energy economies and politics of the Twenty First Century. A list of all dissemination events and activities can be found in the Dissemination Appendix.

3.9 Conclusion

Chapter Three has clearly set out the research questions guiding the project and the ways in which it has been designed to respond to them. The chapter then set out the empirical basis for the project by detailing the techniques used to study household practices, the areas studied and the research techniques used to study energy professionals and policy processes. In particular it has argued that qualitative research can be policy relevant, and that such studies can have practical outcomes for policy makers and practitioners, particularly when dissemination of findings is recognised as being an important part of the research process and one which can have real benefits for communities beyond academia. Having set out the methods employed in undertaking the research, the following chapters will present the data and the ways in which they have been interpreted.

Chapter Four: Shaping Everyday Practices of Energy Use in the Home

4.1 Introduction

"Sometimes my priorities do conflict slightly because to be environmentally friendly might be more than I can afford, like buying a new fridge or something, but other times they complement each other." (Jackie, single parent, living in social rented accommodation, working age, low income, low wealth, terraced property, wall insulation, old inefficient boiler)

Why do people do the things that they do? The processes which animate our lives often seem complicated and elusive but at other times and through different lenses appear so simple that we are able to perform them without thinking, able to make decisions without weighing up options. As energy users we switch between socio-techno-economic relationships often without thought – between PDF and printer, or between taps and kettles – while as a researcher one is given cause to slow down these disconnections and reconnections to consider what kinds of conscious and sub-conscious, technical, economic and environmental phenomena are steering us through these endless streams of energy use engagements.

This chapter explores the domestic energy practices of UK households, focussing on the ways in which they do and do not engage with governmental attempts to shape energy efficiency practices and the factors affecting the extent to which these interventions are effective in altering everyday domestic processes. Guided by the research question 'How are energy use practices undertaken in fuel rich and fuel poor households?' and drawing on Chapter Two's discussion of socio-techno-economic practices of everyday life it considers how individuals take part in certain practices, what factors affect them, and questions the conventional conceptions of subjects and rationality held by policy makers, (Strauss, 2008) and the related 'information-deficit' understanding of environmental practices and lifestyles (Owens, 2000) that still permeate policy making processes.

The chapter then goes on to examine the economic, discursive and technical channels through which individuals connect with government on issues around energy, hardship and environment, considering how householders engage with other local actors including governmental, commercial and hybrid organisations. Building on this, by considering the socio-techno-economic factors which organise energy use practices, the chapter examines the ways and extent to which governmental diagrams are able to structure energy use in domestic settings and the unruly nature of practices which often exceed attempts to influence them.

4.2 Steering Practices

A particular reading of Foucault's notion of power is developed in Chapter Two which focuses on the role of the state in conducting the conduct of individuals by structuring their lives in particular ways. Focauldian studies have described this as being achieved through appeals to individuals' desires, aspirations and long held assumptions in such a way that they are unaware that they are being guided toward particular choices which, to the subjects, look like naturally occurring or self evident situations. In this conception of the subject, the individual acts not out of free, rational choice but as a result of the conditions of possibility and probability which have been structured by governmental processes in order to actualise a diagram, a preferred future arrangement. As such, analysis of a Foucauldian style will tend to focus on how practices are structured by powerful actors, most often the state. Chapter Two also explained how such an approach to power can be integrated with insights into the economic threads running through all processes and the materialities of the world, by drawing on Latour, Law, Barry, and Callon, to create an analytic approach which traces the socio-techno-economic relations which create and actualise diagrams through practices. Doing so enables a response to the project's fundamental interest in energy use practices in fuel rich and fuel poor households which is attuned to the arrangement of people, ideas and things in domestic energy use contexts and the effects of such arrangements.

The effects of attempts made by governing agencies to determine the practices which come out of these socio-techno-economic arrangements are a principle concern of this chapter. From the perspective set out in Chapter Two studying the outcomes of governmental initiatives means focussing on regimes of practice through which

individuals engage with their physical and discursive environments which shape practices them at the micro-political level. It is at the individual level where government becomes internalised and practiced, where devices and technologies of government are become technologies of the self, as Gottweis insists:

"Government, then, refers to the activities which are undertaken by a multiplicity of authorities and agencies that seek to shape our conduct by working through our desires, interests, aspirations and beliefs." (Gottweis, 2003, p255)

Crucially then, having in Chapter Two integrated a Focauldian concern for knowledge, power and discourse with a sensitivity to the material and economic aspects of governmental processes, this chapter is concerned with the process of ordering and arranging the techniques and practices through which power is actualised and has effects for energy users. In particular the chapter examines the ways in which the dissemination of governmentally preferred ways of interacting with energy is achieved by embedding such messages into a heterogeneous array of artefacts, media messages, institutions, relations and other phenomena so that both discursively and materially subjects might be led into particular conditions of possible conduct. The media through which such government-subject relations are performed is discussed below, as is the extent to which they are successful. Firstly though the chapter uses data collected in the interviews to analyse one of the major technologies of government; the appeal to a rational subject. In many ways policy makers and businesses still assume a particular logic to be at work when they design devices, whether economic or technical, to bring about particular configurations of energy use; that subjects will make rational

decisions. When outcomes do not match expectations, or when practices evolve in new, unexpected, 'irrational' ways it can be frustrating and even confusing for governmental actors. Examining rationality from the perspective of the subject rather than from that of the government and its institutions and partners is crucial if key practical problems in energy efficiency are to be addressed. In interviews, which are detailed in Chapters Five and Six, policy makers were continually confused and admitted to not understanding why their programmes were less effective than they might have been in several regards. Examples include why more eligible people do not come forward for assistance under Warm Front or Benefits Entitlement, or why environmental discourses do not have greater sway when it comes to energy use and technology purchasing decisions. What counts as rational, the interactions between competing rationalities and other factors and how individuals relate to and assess the validity of governmental messages, are focussed upon in the following section.

4.2.1 Construction of Rationality as a Means of Disciplining Practice

The idea that humans will at every turn seek to maximise their potential benefits and minimise potential costs is one of, if not the, foundational principle in neoclassical economic theory. Rational Choice Theory (RCT) proposes that we are always in different versions of the same conundrum – that our desires are unlimited but our capacity to realise them are limited. As rational individuals we seek to maximise the 'utility' we can derive from actions, a term traceable to John Stuart Mill's 'Utilitarianism' (Mill, 1861) which itself was inspired by the thoughts and teachings of Jeremy Bentham, who is credited with making the following observation about the essential condition of humanity:

"Nature has placed mankind under the governance of two sovereign masters, pain and pleasure. It is for them alone to point out what we ought to do, as well as to determine what we shall do. .... They govern us in all we do, in all we say, in all we think: every effort we can make to throw off our subjection, will serve but to demonstrate and confirm it." (Bentham, 2009, p17, original, 1789)

This unavoidable conflict between maximising the potential reward or good to come from an action and minimising pain, which in economic terms is most often equated with cost or reduced income, is in neoclassical economics the mechanism which guides the rational actor through every single event. It amounts to a calculative account of rationality, in which every decision is made on the basis of more or less conscious calculations and probabilities of outcomes and that the decisions taken are entirely the product of such equations. Crucially, where a choice does not adhere to the logic it is deemed to be irrational (Barnes, 2003). Contemporary neoclassical economics is still heavily influenced by this notion that decision making and behaviour is informed by rational assessments of situations which seek to maximise self interest (NEF, 2005).

In the context of bringing about changes in energy use practices, governments and other governing organisations have, in the main, constructed policy which depends upon individuals behaving in similarly rational ways who, given appropriate and adequate information about the environmental impacts of their actions, will modify their behaviour (Barr and Gilg, 2007). Critically this leads to the conclusion that where behaviour does not bend to the governmentally disseminated rationality it is irrational.

The widespread extension of the notion of the subject as a rational actor into environmental behaviour analysis has lead to the identification of a 'information-deficit' model of environmental behaviour (Burgess et. al., 1998) which borrows the linear causality of RCT to suggest that people do not act in environmentally friendly ways because they do not know enough about the issues or the impacts of their actions. This model of behaviour relies on "*the A-I-D-A logic of behaviour; that is, Awareness, Information, Decision, Action. Most policies, especially at the national level, make an implicit assumption that the means by which to resolve environmental assumptions is to make individuals aware … then provide accurate information on how to ameliorate the problem."* (Barr and Gilg, 2007, p362) Through this approach to everyday behaviour governing agencies ask individuals to act towards a common good, i.e. reduced greenhouse gases and therefore less extreme climate change, rather than individual utility based on the utilitarian premise that if individuals were better informed they would make better decisions.

The Chapter will now proceed by examining how knowledge and discourses of climate change and fuel poverty have been received by individuals.

4.2.2 Engagement with and Disengagement from Environmental Discourse Regimes

This section analyses the links between homes and wider energy efficiency networks, focussing on the discursive engagements between governmental agencies and individuals. The following quotations from householder interviews suggest that while

climate change has become increasingly familiar as a discourse it was interpreted to be a re-emergence of a previous common sense way of using resources. Quotations such as these suggest that climate change discourse is becoming recognised and is an increasingly prevalent narrative:

"I've always had a mindset to not waste things but it's coming more to mind now ... with climate change there's more being said about it now." (Mr and Mrs W, married couple, private home owner, pensionable age, low income, low wealth, terraced house, electric wall heaters, old loft insulation)

"I think climate change is right at the front at the moment. It's a huge animal that a lot of local authorities are finding difficult to manage. … It was always on a back burner, but now it's becoming a paranoia." (Mr H, married couple, private home owner, pensionable age, middle income, high wealth, semi-detached house, loft and wall insulation, old gas boiler)

"It's all coming back round again, the messages I'm getting about climate change are similar to things my mum was trying to do." (Mrs J and family, single mother, private home owner, working age, middle income, middle wealth, terraced property, solid wall, new gas boiler)

"I have the feeling that it is my moral responsibility not to waste energy but I don't know if that comes from media messages or somewhere else - but that's how I feel."

(Mrs C, married carer, private home owner, pensionable age, low income, high wealth, large detached property off gas grid, no insulation)

The first thing to establish from this material which is typical of most responses to questions about climate change is that participants reported that their conscious awareness of climate change had increased recently. All forty one participants were aware of the climate change phenomenon although they often conflated concerns over climate change with wider environmental concerns, one participant referring to it as "the eco". While there may have been a lack of precise knowledge over what the greenhouse effect is and how it works, the interviews do suggest that discourse construction and reinforcement from government institutions had been effective in bringing climate change and its associated concepts into the vocabularies and conscious thoughts of individuals. In addition, conducting home visits to the householders revealed that they were readily linking media messages from TV news, printed news and documentaries to their domestic practices but only a minority of participants, five from the forty one, reported consciously trying to reduce energy usage due to the messages they were exposed to. The quotations and the wider experience of carrying out the home visits suggest that while climate change is a discursive repertoire which is gathering momentum and engagements with climate change discourses were reported and observed to be occurring, it is not modifying practices of energy use significantly in most households. The factors contributing to this failure to create a home energy use that is 'heavy with (environmental) norms' (Murdoch, 1995) are analysed below in Section Three.

Secondly, participants did not recognise fuel poverty as a discursive phenomenon, and it was not thought about as an identifiable issue facing society. Instead the characteristics that the fuel poverty discourse coalition would diagnose as constituting fuel poverty were seen as a series of more or less linked personal socio-techno-economic problems, so quotations about engagement with fuel poverty, the policy issue, were not found. Instead, participants talked about their own domestic economy, the interactions between budgets, bills, energy meters and energy technologies. These interactions become important when attention is turned to understanding how and why environmental rationalities so often fail to monopolise practices.

In order to better understand energy use practices and the relationship to government the following section develops a three part deconstruction of the notion of individuals as the rational subjects of governmental interventions.

4.3 The Rational Subject Deconstructed

Geographers since the late 1980s and early 1990s have criticised the 'strong' conception of economic rationality (Strauss, 2008). However, although post-rational accounts of behaviour and action are becoming increasingly popular in economics, they have "remained an undercurrent in recent debates about the current shape and future focus of economic geography." (Strauss, 2008, p138) This part of the chapter argues that there are three ways in which the notion that energy use practices are the result of the rational decision making of a discreet individual is inadequate. Analysis of data from the householder interviews leads to the conclusion that attempts to theorise everyday life as rational or to modify it through information and discourse based

interventions face problems of institutional disengagement, overlapping economic demands and material resistances. These three aspects of energy use practices are discussed in turn and in conjunction with the theorisation of practice as a socio-techno-economic entity set out in Chapter Two amount to a three part deconstruction of the conception of practice as rational behaviour. Doing this will do more than deconstruct rational choice however; it will illuminate the everyday life of energy users in order to provide insight into why the major energy efficiency policy programmes have not yet brought about the level of change in society that both climate change and fuel poverty discourse coalitions might have hoped for or even expected.

4.3.1 Disengagement from State Institutions

"I think there's more to worry about than people using less energy. I think businesses use more energy than people. Industries and things like that should show an example." (Mrs S, single person, private home owner, pensionable age, low income, medium wealth, terraced property, insulated loft, new boiler)

"Politicians are more interested in fighting each other than doing anything. They're more interested in who they're sleeping with than saving energy! I just switch it off." (Mr B, single person, private home owner, pensionable age, low income, low wealth, terraced property, wall insulation, old boiler)

"(Would a government campaign from central or city government change your energy use?) No. A lot of what I've seen focuses on ordinary people, and plays on the sense of

feeling guilty. I think they steer clear of businesses because they haven't got the courage to take them on. We are the easy route. It's all about low energy bulbs, recycling etc. When businesses have got computers on all night, they're picking on the vulnerable so I don't trust them. I just don't trust them when they say one thing and do the other. David Campbell rides a bike then has a car follow him with his stuff. It's like a bloody practical joke!" (Mrs M and daughters, single mother with two daughters, living in housing association property, working age, low income, low wealth, terraced property)

"In past experience it's a total waste of time talking to the council. Oh yes we'll do something about this or that. They do nowt. We just don't have any services - we fend for ourselves and that's the way we want it. I don't want them interfering with me." (Mr and Mrs L, married business owners, private home owner, working age, high income, high wealth, detached property off gas grid. Well insulated heated by wood burning stoves.)

"Energy efficiency means not doing what the council is doing at the tip - not wasting things. If you go out of the room you turn out the lights. In the winter you keep the doors shut. There are a lot of things you can do to save energy. They're common sense things. I don't need the government to tell me. Anyone should know. It's common sense." (Mrs J and family, single mother, private home owner, working age, middle income, middle wealth, terraced property, solid wall, new gas boiler)

The above quotations illustrate the various ways in which individuals are consciously and explicitly disengaged from state institutions, particularly national government. Trust in and respect for the formal institutions of government was very low among participants. This resonates with the findings of others who have studied barriers to engagement of the public with governmental climate change messages (Hinchliffe, 1996; Owens, 2000; Stoll-Kleemann et al., 2001; Futerra, 2005; Lorenzoni et al., 2007). In particular, Lorenzoni et al. argue that when relating to government "deprived groups tend to experience greater financial constraints, compounded by feelings of social alienation." (Lorenzoni et al., 2007, p 454) Although some quotations below reflect a greater sense of trust in and better relations with local government than national government, institutions and individuals in central government were largely mocked, distrusted or derided, as Hinchliffe found to be the case in his study of governmental attempts to link climate change to domestic energy use in the mid 1990s (Hinchliffe, 1996). Engagement with the local government institutions varied somewhat across the case studies, but reflected the local authorities' abilities to work more closely with the participants on local issues:

"What is your gut feeling about the council on energy and environment? My perception is that they actually are quite good. A lot of people have criticised the appearance of wind turbines on the civic centre but I think it's great!" (Mrs G, single person, , private home owner, pensionable age, low income, high wealth, semi-detached house, solid wall, old boiler)

“I think the council are really good. I think they’re the first council in the UK to have wind turbines; it’s a very visible thing to see for anyone that comes to Huddersfield.” (Mr T, married couple, private home owner, pensionable age, middle income, middle wealth, detached house, gas boiler, no insulation)

“GP: Who would you listen to? Government, energy business or someone else?

Participant: Certainly not the government minister because they lie through their teeth. You just don't know. You can no longer trust a politician; it’s no longer just the socialists. … I'd take advice from the county and district because I don't think they have as much reason to lie as politicians.” (Mr and Mrs W, couple, , living in housing association property, working age, medium income, low wealth, terraced property, insulated loft, new boiler)

One interesting trend to emerge from the data was that despite the widespread distrust in government, the level of engagement with the local authority seemed to be related to income and tenure. Those on low incomes who were in economic relationships with the local authority as tenants, benefits recipients etc. were more likely to view the council as a source of assistance in times of need. One respondent called the council to fix a broken shower during a home visit even though the council were not responsible, as they were tenants of a registered social landlord and the shower had no link to the council. This coping strategy, to rely on the council to provide a welfare function, was noticeably absent from middle and high income participants, none of whom mentioned contacting the council for assistance with insulation, heating, or energy advice.

4.3.2 Expertise and Epistemological Trust

The material above highlights a crucial weakness in the AIDA logic. The assumption that filling an information deficit held will change behaviour patterns requires that certain 'expert' groups are recognised as having reliable knowledge and that other 'lay' groups are in the position of being willing recipients of knowledges such as, for example, the greenhouse effect. However, as their expert status is eroded as the above quotations suggest is happening in the UK, the ability of governing agencies to influence individuals by making knowledge claims is compromised. Several writers in the late 1990s criticised the top-down, elitist conception of knowledge and expertise (see Jasanoff, 1997, 1999; ESRC, 1999) and have exposed the uncertainties and assumptions found within policies and the scientific models on which they are built. These critics point out that with uncertainties hidden inside models, the extent to which experts can claim to be in a position of epistemological superiority to 'lay' persons is greatly overstated. (Jasanoff 1997, cited in Owens 2000) Examples of such uncertainties in science are the widely divergent global warming scenarios in the UK Climate Impacts Programme (DEFRA, 2003), or the similarly broad array of future fuel poverty scenarios based on assumptions about energy prices and winter temperatures (DTI, 2007, p77) which amount to little more than educated guessing.

More recently, these re-evaluations of expertise have informed a critique of public trust in institutions. Bickerstaff and Walker suggest that "political recourse to the 'real' of scientific rationality carries little weight in a societal atmosphere charged with popular

distrust and cynicism of political and scientific institutions, non-responsibility and feelings of powerlessness to affect change," (Bickerstaff and Walker, 2003, p61) while O'Neil (O'Neil, 1997) argues that '*epistemological trust*' rather than information is missing as individuals no longer put faith in the sources of expert knowledge. These insights reinforce the analysis of the data here as the disengagement observed matches that found by O'Neil and Bickerstaff and Walker. The corrosion of trust results in what policy makers might interpret as 'irrational behaviour' which can from this perspective be more meaningfully viewed as evidence of the failure of expert knowledge claims to effectively convince individuals of their soundness or reliability.

In addition, the inability to actualise highly disciplined environmental diagrams can also be viewed as an effect of the potency of different, less cognitive ways of making sense of and acting in the world. Owens and Driffill also found that "the take-up of energy efficiency measures has been disappointing and behaviours have often become *more* energy-intensive," (Owens and Driffill, 2008, p4413). Their argument that energy use practices are influenced by a complex array of factors resonates with the argument made here that more than rationality determines the ways in which policy engagements are interpreted and domesticated (see also Devine-Wright and Devine-Wright, 2004). These other ways of making sense of the world are discussed below, but what needs to be made clear here is that most of the participants in this study show clear signs of disengagement from state institutions and often re-interpret messages from government as being common sense, or reformulations of pre-existing lay knowledge. As a result, only 5 of 41 participants reported modifying their practice in light of energy efficiency messages from government. This suggests that a top down

vision of government in which knowledge is created by experts and is translated into new energy efficiency practices is flawed. In particular, Owens and Driffill point out that conceptions of everyday life, such as the information deficit model, are attractive to policy makers as they "pointed to relatively simple solutions (public education campaigns, for example) which, to borrow Fisher's term, were 'yesable' (Fisher, 1971). Recognising the complexity of factors involved, on the other hand, makes it harder to identify appropriate policy levers," (Owens and Driffill, p4415) This challenges researchers to work *with* the complexity of energy use practices that are more than rational. The chapter proceeds by building on this insight to suggest that other processes interact with environmental rationalities to create contested, hybrid practices.

4.4 Deconstructing Governmental Rationality: Economic Rationality and Waste Aversion

This section of the chapter demonstrates the power of the need to manage the domestic budget in affecting energy use, focussing particularly on how domestic economic imperatives function as counter rationalities to those mobilised by environmentally constructed governmental diagrams of low carbon domestic energy use. Earlier in the chapter economic utilitarianism was criticised as being too essentialist a conception of behaviour. However, rather than treat utilitarian economic decision making as a fundamental characteristic of the human condition as in classical and neo-classical economics, here the household economy is conceptualised as a particularly common and powerful rationality which has a potent structuring effect on practices. The

interview data strongly suggest that managing the domestic budget remained a high priority for almost all respondents, as the quotations illustrate:

“To be energy efficient is to live within your means. To use as much as you can afford to use.” (Ms S, single person, private home owner, working age, low income, low wealth, semi-detached property, loft and wall insulation, new boiler)

"I know it sounds complicated, and a lot of people just turn the heating on and don't think about it but in the situation I'm in at the moment its weighing up how comfortable the two people and the dog are in balance with how much the bill is going to be for the quarter to how much can I get away with not putting on to avoid things getting costly in the long run. I can't get what I want but it’s about getting the right balance" (Jackie, single parent, living in social rented accommodation, working age, low income, low wealth, terraced property, wall insulation, old inefficient boiler)

“We’ve actually had to go into our savings to pay our gas and electricity bill.” (Ms H, co-habiting couple, private home owner, working age, high income, low wealth, terraced flat, no insulation, old boiler)

“GP - Have you been aware of the energy price rises lately?)

Participant: It worries you a bit don't it? When we first got that in, five bags of each (type of solid fuel) cost me £50, now it’s more than doubled. That’s in five or six years. (GP - Has it changed how much you use?) No, I've no intention of starving.

We're not going to starve to death. Like we say, we just pay our bills, we buy our stuff and we live on the rest. But I'm not going to freeze." (Mrs and Mrs O, married couple, living in social rented accommodation, pensionable age, low income, low wealth, semi-detached property with wall and loft insulation. No heating system other than single coal fire and back boiler).

The above quotations illustrate that energy use always has economic effects which are factored into practices in various ways. The embodied experience of warmth and cold and the commitments many participants demonstrated to waste aversion are inescapably linked to their household finances by techno-economic networks which translate heat, light and power into money and back again. The result of this is that when participants referred to the financial aspects of heating the home they very often referred to various versions of classical economic decision making behaviour, explaining that they needed to keep costs down, get the most energy for the least cost, avoid paying overly high prices and so on as this quotation illustrates:

"I'm now in a situation where I pay my bill three months in arrears every time. I see how much it is and they let me pay it off a bit at a time. I got into that situation because I didn't realise how much electric heater cost so the first winter I had the heaters on all the time and the bill came in, it was about £500 per quarter so I had to adjust. It's also because the water is heated in a huge water tank – it's lovely to have a huge water tank because it's a really deep bath - but it's really expensive. This year I've hardly turned it on at all - I've maybe given it a quick boost if the fire's not been on - but we've had

showers instead of baths. The open fire heats the water in the winter, so why they can't make the heaters all connected I don't know, because it would be so much better. So I've noticed that this year the bill is £364, and that's without the immersion heater, so it's like £200 cut off the bill." (Ms R, single parent, living in housing association property, pensionable age, low income, low wealth, terraced property, insulated loft, new boiler)

In many cases such descriptions of decision making involve calculations, conscious decisions about costs and benefits and ascriptions of behaviour types to individuals on the basis of their financial consequences. That such comments were very common in the interviews is not interpreted as an indication that individuals are *essentially* rational, utility maximising economic actors, but it does provide evidence to suggest that when consuming energy in the home the logic of economics has a strong structuring effect on practices. The rationality of least cost and best return *does* influence the outcomes of interactions between economic, technical and social components of energy networks as it encourages individuals to attempt to organise their home, around such a domestic diagram. Being able to manage domestic finances remains a high priority in determining energy use practices and powerfully organises practice around often very inflexible financial circumstances. It illustrates the point made earlier, that even powerful attempts by state institutions to shape practices are de-coded in complicated, often challenging conditions and the collisions between environmental and economic rationalities which all circulate around and through the same material objects create contested outcomes which are difficult to predict. These competing rationalities of reducing carbon dioxide and reducing costs are each

internally coherent and logical but when they interact the outcome is that practices emerge which are influenced by each but not monopolised by either. So keeping energy costs within a set budget is one way in which energy use patterns are structured, but only one factor among others which interact to create complex and overlapping socio-techno-economic patterns of everyday energy use.

A further point emerging from the analysis is that the persistence of the rational consumer subject position is a reflection of the context within which energy is currently provided. In a different provision model, nationalised electricity and gas rates for example, the subject position of 'rational self interested actor' would not make sense, but in the context of privatised energy retail markets and increasingly commercial energy governance it offers a way to understand what is going on and feel empowered to be 'savvy', to get a bargain, to be thrifty, to be efficient or to be gluttonous. The co-presence then of macro-orderings of environmental duty and privatised energy markets with the demands of the domestic budget produces hybrid practices of energy use. Subjects are called upon to perform energy practices by terms of engagement set by more powerful network managers, but their co-enrolment in national scale environmental and energy market diagrams as well as domestic diagrams of cost aversion makes their practices hybrid entities, in the sense that practice entities (Shove, 2007) are not only relationships between a single set of social beliefs located in a single technical and economic context but are the outcomes of the interaction between multiple sets of co-present social and economic orderings and the technical objects and spaces which they share.

4.4.1 Plugging Policy into Practice- Performances of Waste Aversion

The data concerning the management of the home budget also suggests that some elements of governmental discourses that have been successful have benefitted from plugging into and re-enforcing already existing lay knowledge and dispositions about resource use as the following material illustrates:

"I've got energy saving bulbs, but not because they save energy - it's because they last longer than normal bulbs. I thought phew hey - this is a waste of money." (Mr PJ, single person, living in housing association property, pensionable age, low income, medium wealth, terraced property, insulated loft, new boiler)

"I'm an environmentalist and I don't like waste. That's how we live our lives - we try not to waste things." (Mr and Mrs SC, married couple with kids, private home owners, working age, middle income, middle wealth, semi detached house, solid wall, old boiler)

"I don't like waste – old clothes go to charity shops, you know. If I was being wasteful I would ask myself why, and if I couldn't think of a reason it would bother me – it'd be like a character flaw. We've got this flat, so we look after it." (Ms H, co-habiting couple, private home owner, working age, high income, low wealth, terraced flat, no insulation, old boiler)

“Energy is something you think about. My mum has always switched things off at the wall even though she’s got a remote and people would say why are you doing that and she’d say you shouldn’t waste thing.” (Mrs J and family, single mother, private home owner, working age, middle income, middle wealth, terraced property, solid wall, new gas boiler).

“In my head the environment and the financial savings come together under the heading of not being wasteful... If I sit down and think about them I do separate them out but on the whole I just have certain things that I do and that I feel happy to do, as long as they fit into my lifestyle.” (Mr and Mrs AS, couple, living in housing association property, pensionable age, low income, low wealth, terraced property, insulated loft, new boiler).

“The things we’ve been talking about are not the same, but similar to things my Mum would do. She lived through the war and would talk about saving things, making things last. …. It makes me think I’m doing the right thing, because it’s what my Mum used to do, and it makes you feel good about yourself, you’re saving things.” Mr and Mrs SC, married couple with kids, private home owner, working age, middle income, middle wealth, semi-detached house, solid wall, old boiler)

“I’ve always had a mindset to not waste things but it’s coming more to mind now that energy is so expensive so it’s a personal financial thing but also things that have been around for years and years and years but now with climate change there’s more being

said about it now." (Mr K, single person, private home owner, pensionable age, low income, high wealth, large terraced house, old gas boiler, solid walls)

By resonating with dormant attachments to waste aversion that have been latent for a period of several decades governmental messages disseminated with the intention of actualising a low carbon diagram of domestic energy use seem to have acted as catalysts for the re-vitalisation pre-existing beliefs about wastefulness. In several interviews individuals referred to waste when prompted to talk about energy efficiency, climate change or fuel poverty. Their notions of waste and waste aversion, often informed by their own or their family's previous experiences of hardship, rationing or times of relative scarcity, were powerful narrative tools, allowing them to make sense of their contemporary resource consumption practices. Although the word 'waste' was never introduced into the interviews by the researcher, it was the most common way for individuals to relate their own lived experiences of energy use to contemporary energy issues perceived to be circulating outside their homes, and indeed many gave the impression that they felt that waste was what the sessions were about, being introduced into the conversation by 27 of 41 participants. Reducing waste was felt to be a way to 'do the right thing', hence often equated with moral duty and virtue and was often very closely linked to self worth and self evaluations.

While waste aversion, in many circumstances, will have similar outcomes to the choice of a self-interested rational actor, reduced costs being the most obvious, it is animated by a different process; one which draws on the sense of duty to preserve things for themselves, as seen in the comment 'we've got this flat so we look after it'. There is a

sense of responsibility to protect and preserve the life of things in themselves, whether individual items or the environment as a whole, which is informed most often by personal or parental experiences of times when 'things' were more scarce and more difficult to acquire than they are now. The resulting respect for the abilities of the 'things' (to perform functions like keeping the family warm, for example) was woven into the waste aversion performances of participants. Furthermore, waste aversion was not only a discursive regime into which householders had been enrolled, it was a place-contingent practice which was constituted by the relations between several overlapping discourses, memories, economic conditions and the material / technical conditions of possibility in each different domestic setting. It is a thoroughly hybrid form of energy use which, while not created by governmental discourse, can perhaps be re-invigorated as it carries with it such positive connotations and sentiments and it provides a narrative thread which can weave together fuel poverty and low carbon objectives.

This process through which policies plug into practices is an imperfect one however as each translation, the process through which ideas and things combine to create socio-techno-economic outcomes, creates not a reproduction but a co-production. As such the process of translation is more like a process of mutation as at each stage the diagram which is attempting to structure the new configuration finds itself having to make pragmatic compromises due to the presence of other discursive rationalities as well as the economic and technical properties which also have a structuring effect on the translation. Because of this it is more useful to think of this process as one of alignment rather than translation, as Chapter Two argues (Murray Li, 2009). The interplay between domestic financial management and socio-technical respect for

resources then is refracted through contextually specific socio-techno-economic lenses in each home leading to a variety of related but different performances of waste aversion and budgeting. In each home, reducing waste was practiced or imagined in different ways. Even next door neighbours with the same house type, same infrastructure and same level of income and family composition found different ways to interact with their home, their finances, and their technologies. This can be seen in the different ways in which households achieved their waste aversion. Three examples from the sessions illustrate this; by collecting fallen wood (which would otherwise be wasted) in some cases, by wrapping up in extra layers of clothing in the evening in others, and by cooking meals in their range cooker to make use of its permanent heat in another.

While the above discussion has suggested that information deficit approaches are epistemologically flawed, the importance of managing the home budget and the personal commitment to waste reduction mean that providing information about how to be less wasteful is not entirely ineffective. On the contrary, the data suggests that the inclination towards waste aversion found in over half of the participants, albeit latently in some, provides a socket into which ways of reducing resource use framed as sound domestic economic management might be plugged, acting as a catalyst for the positive interaction of latent beliefs, technologies and habits rather than a new monopolising diagram for domestic relations. This way of combining discursive framing of resource use with deeply held lay knowledges is an exercise in the actualisation of governmental diagrams. The exact practices which might be generated by plugging into practices in this way can be only imperfectly influenced by government as not

only is each domestic economy different to the next but they need to be materialised through the mobilisation of various technical devices. The next section explores this difficulty in disciplining patterns of interaction between the heterogeneous components of energy networks.

4.5 Deconstructing Governmental Rationality: Getting Comfortable Through Unruly Practices

A major theme running through this analysis has been contextually attuned de-coding of governmental scripts and the problems that this causes for governmental agencies trying to organise energy use practices around diagrams of low carbon or low cost policy futures. The unruly nature of domestic practices and their resistance to disciplining efforts is a function of the multiplicity of their relationships. Rather than being monopolised by a single discursive regime and the home becoming a space of prescription (Callon, 1992), practices are often more usefully thought of as interactive, constituted by relationships between various governmental and non-governmental orderings, materialities and economic forces. In this light, using Murdoch's analytic distinction developed in Chapter Two, the home seems to be more a space of negotiation rather than prescription, where durable resistances and emergent re-connections prevent the practices patterns from becoming heavy with governmental norms. This leads to a plurality of energy use patterns in domestic settings. This section of the chapter looks firstly at how technical phenomena bring about de-codings of governmental narratives and secondly at how comfort trumps all other factors and

leads to a variety of unexpected practices as a result of its status as a priority for householders.

4.5.1 The Actancy of Technical Components of Energy Networks

“You get natural gas in Penrith, in the towns, but you don’t get it out in the country so you have to make a choice; bottled gas, oil, electricity, or wood and coal.” (Mrs C, married carer, private home owner, pensionable age, low income, high wealth, large detached property off gas grid, no insulation)

“The most wasteful thing we do is tumble dry. We don’t have a very big yard area so it'd involve a lot of switching things around. I do in the summer but in the winter things take all day to dry and you have to have washing hanging all around the house ... it makes the house damp...” (Mr and Mrs W, couple, living in housing association property, working age, medium income, low wealth, terraced property, insulated loft, new boiler)

“The flat’s really cold so if it’s set to 20 it’ll be on all the time. It won’t be 20, maybe 18; it’s quite a cold flat. ... You can’t insulate it.” (Ms H, co-habiting couple, private home owner, working age, high income, low wealth, terraced flat, no insulation, old boiler)

“With the Aga it’s on all the time, so the more you use it the more efficient it becomes. We're very aware of that”. (Mrs and Mrs L, married business owners, private home owner, working age, high income, high wealth, detached property off gas grid. Well insulated, heated by wood burning stoves.)

“The oil boiler heats the whole house but when there's just the two of us here we only heat this side of the house. We've got nine bedrooms; it’s very old and very inconvenient. It’s in a fairly rackety state, so when the wind blows and the rain blows from the NW it just blows straight through everything. There's nothing I can do about it - it comes through the old window frames, the door frames. It just blows through there, it’s like a waterfall. That doesn't help so we don't use that room at all. There are some rooms in this house we don't use at all. It’s very, very difficult to keep these old houses water tight, and it just blows through the stone. The windows are very old and the glass is paper thin.” (Mrs C, married carer, private home owner, pensionable age, low income, high wealth, large detached property off gas grid. No insulation).

“You can’t turn it off. You never turn the heating off in a house like this. It’s damp. It’s not the temperature it’s the humidity.” (Mr D, co-habiting couple with teenage children, private home owner, working age, high income, middle wealth, terraced house. No insulation, old gas boiler).

The data above suggests that the material capacities of different combinations of weather, building construction and technology structures the opportunities which are presented to people when performing energy efficiency, waste aversion and so forth. In each quotation it is clear that the ways in which individuals use energy is significantly influenced by the technical condition of their homes and their ability to change it. In some there is no access to the gas network, for others there is a need to protect the home from damp, while in others the age and condition of the home prevents them from being able to reduce their energy use. The multiplicity of technical configurations means that actually achieving individuals' own preferred patterns of energy is use very difficult and in many cases unachievable. What is more appropriate is to recognise that individuals are enrolled in longstanding relationships with energy technologies, their homes and their financial positions and that the resulting behaviours, outcomes of relationships between domestic budgets, cultural understandings of waste and comfort and the potential for them to engage with governance actors to modify their experiences of their homes, are pre-structured by the technical conditions of possibility afforded by the devices and systems with which they live.

4.5.2 Socio-Techno-Economic Comfort

Building on this insight, it became apparent throughout the householder research that achieving comfort was a particularly important, multi-faceted aspect of energy use. These quotations illustrate the various ways in which comfort was prioritised and practiced:

“The only time I'm uncomfortable is in the summer, the sun just pours in here so I have to use a fan. I know that defeats the point because you're using electricity but it’s unbearable.” (Ms S, single person, private home owner, working age, low income, low wealth, semi-detached property, loft and wall insulation, new boiler).

“I know I’m not supposed to, but if I need to I’ll just open the windows. I know it’s a waste of money but you get a nice draught, its warm but you’ve got that draught.” (Mrs Mc, single mother with adult child, living in housing association property, working age, low income, low wealth, terraced property, insulated loft, new boiler)

“GP: How do you make decisions about comfort and discomfort?

Participant: I always wear a jumper and if I'm cold in the jumper then it’s usually time to switch the heating on.” (Mrs G, single person, private home owner, pensionable age, low income, high wealth, semi-detached house, solid wall, old boiler)

“If it’s cold you put more on, if it’s too hot you put fewer on. I am conscious of the environment because everyone is harping on about it but if I'm cold I put logs on. If I'm too hot I don't, simple as that.” (Mr and Mrs W, married couple, private home owner, pensionable age, low income, low wealth, terraced house, electric wall heaters, old loft insulation)

“It’s on settings to go on and off throughout the day. On at 7-9, then on at 1pm and 4pm, 7pm and 9pm even if we're not in. It keeps the whole house warm so we don't

have to keep the fire on. I think if you had it all day you'd get used to the warmth, but when you have it in bursts like that it sort reminds you that it's there so you appreciate it. It stays off a good half an hour after it's off." (Mrs J and family, single mother, private home owner, working age, middle income, middle wealth, terraced property, solid wall, new gas boiler).

"We just live on what's left over after we've paid for the coal. We just don't spend what we haven't got. If we get a really cold snap, we don't get them as often now mind, but if it gets really cold we'll just stay in. But we'll not freeze." (Mr and Drs D, retired couple, living in social rented accommodation, pensionable age, low income, low wealth, semi detached property with wall and loft insulation and new solid fuel stove).

Comfort was a significant feature of responses to questions about energy efficiency and, most significantly, it was most often cited as being more important than energy efficiency, climate change or energy affordability. Warmth was reported to be the first priority for most respondents, regardless of how warmth was accomplished, while a few participants went on to mention being cool in summer as another component of comfort. As well as thermal comfort, living in a damp-free home was an important part of being comfortable at home. Whether comfort was achieved by putting on more clothes or by turning the heating up, being comfortable was a major part of the energy use practices of all households. In addition, there was little difference between the priority attached to comfort across fuel poor and fuel rich households as even those

that did have to make sacrifices to achieve it were willing to do so. Sacrifices included cutting back on other expenditure, eating out for example, or going to bed very early to be warm while missing out on social or entertainment activities. For the fuel rich comfort was something which several participants were actively investing in. For example, two fuel rich households had done so by purchasing wood burning stoves of various kinds to create a comforting warmth throughout their properties which was not needed to satisfactorily heat the home but which added to the feeling of cosiness and homeliness.

4.5.3 Gauging Comfort Levels

While some respondents knew the temperatures at which they were comfortable or uncomfortable, more simply knew whether they were too hot or cold and how to modify their environment to achieve comfort, which they would always do. Most participants who referred to temperatures were within World Health Organisation thermal comfort guidelines (WHO, 2008) which recommend a minimum indoor temperature of 21°C for living rooms and 18°C for other rooms. Those who did not refer to temperatures tended to describe comfort in terms of bodily responses to the indoor atmosphere. The feeling of being cold was something that all 41 participants wanted to avoid when they chose to and achieving thermal comfort was a more immediate and powerful priority than responding to discourses about climate change which were thought of as being of secondary importance. In several cases participants had income levels and energy systems which would make them very vulnerable to fuel poverty, but even in these cases comfort remained a top priority.

4.5.4 Achieving Comfort

Where the greatest differences arose was in how comfort was achieved rather than the temperatures required for thermal comfort. Where there was agreement, those in centrally heated homes would use the thermostat to change the temperature of the entire home, with only one household using Thermostatic Radiator Valves (TRVs) to heat individual rooms differently. The wasted energy used by heating empty rooms was seen to be an unfortunate but largely unalterable consequence of using central heating – "that's what it's designed to do" (excerpt from householder interview). In some fuel rich households solid fuel stoves and in others range cookers were used on a permanent basis to provide background warmth. This '*takes the chill off*' the winter air but also was done to prevent damage to pipes and to prevent damp from becoming a problem, so while it helped individuals in some respects it also meant that fuel was being used constantly.

In different technical and economic settings, the achievement of comfort was dependent on the properties of fuels and heating technologies. Shove's 2008 essay, "Manufacturing Weather" (Shove, 2008) also draws attention to the ways in which artificial indoor climates have become normalised in ways which "are of direct consequence for global warming" (Shove, 2008, p1). Her emphasis on the expectations that contemporary householders have of their indoor climate illuminates the potential for technological 'progress' to affect the environment *through* its ability to reconfigure the relations between householders, technologies and ideas, incrementally raising

expectations of comfort. Shove's argument in several papers has been that at a societal level notions of comfort and convenience are converging at environmentally unsustainable levels (see Shove, 2007, 2002, 2002a). This project contributes to Shove's analysis by highlighting that this convergence does not require and indeed, in this research, is not based on converging technical systems. Rather, the variety of domestic energy scenarios that continue to exist across the UK and the variety of practices which are performed in these settings seem, in their myriad ways, to enable householders to achieve comfort. A very interesting example from the research is a couple who had only a single solid fuel fire in their three-bedroomed semi-detached home. They regulated their temperature by moving closer to or further from the fire in order to warm up or cool down, without altering their fuel use, so energy was very often wasted on an open fire, in part due to their inability to control its output. However, they reported enjoying being able to make a spatial response to comfort and liked the fact that their home had different temperatures in different places meaning they could easily experience different conditions, to warm up or cool down, within their home at any time, and that air circulation around the home would be aided by the thermal differentials. In this case only a small part of the living room was warm enough to meet the WHO standards but the participants knew where that area was and by being skilled users of their home and the fireplace they could be comfortable in a different way to the ways in which Shove focuses on (typically central heating and cooling systems). This case was at least as environmentally damaging as the classic central heating thermostat which never moves below 25°C, but it shows that while comfort levels may be increasing they are achieved through a variety of socio-techno-economic practices.

For some fuel poor households however, the costs can spiral and the thermal comfort provided can be less than ideal. Particularly in homes with electric storage heating where the benefits of cheap electricity on the Economy 7 tariff were in all cases felt to be outweighed by the poor performance of the heaters and the residents' inability to satisfactorily control the timing of their output.

4.5.5 Economic Comfort

As Chapter Two argues, what we might think of as social phenomena are in many ways always also economic ones. This is particularly the case with regard to energy and achieving comfort requires a productive engagement with the "ordinary economies" (Lee, 2006) of heating and insulation technologies, including clothing, which some households found difficult to manage. In many cases sacrifices had to be made in order to achieve thermal comfort without getting into fuel debt, suggesting that comfort or a sense of wellbeing may for some require both thermal and economic comfort. The examples given above of the single mother going to bed very early to avoid paying for heating but thus being able to stay warm, or of the couple living on what was left of their pension after the coal had been paid for show very powerfully that quality of life is often the first thing to be sacrificed in low income households in order to achieve thermal and economic comfort. Conversely, in middle income households with non-gas heating energy efficiency and cost reduction are often disregarded in order to enable energy inefficient, and environmentally unsustainable, comfort practices motivated by alternative diagrams. In particular, a desire for independence from government and from large businesses was prevalent in the Eden District, the rural area study. Here, several fuel rich households were actively engaged

in opting out of the energy network in order that they could provide their own energy within the home using the natural resources available to them, most often wood.

Conversely however, in some of these and many other homes energy efficiency took, at best, second place to comfort, cosiness and hospitality. Some families had an efficient boiler but had invested in new entertainment technology such as plasma TVs and games consoles. The extent to which cost savings from the energy efficiency interventions were being spent on other technologies and the extent to which the carbon dioxide savings were being replaced in this way had not been thought through by participants. In such cases the diagrams that most effectively structured practices related to aspirations and imaginings of contemporary middle class family life; the kinds of 'things' that neighbours and extended family owned and did, or that characters in TV series did. These imaginings were better able to dictate the conduct of individuals as they were perpetually re-enforced indirectly through everyday life itself rather than governmental interventions. They were also better matched to the hardware of everyday life as they were *about* the TV, the kitchen, the living room and were achievable given the financial and technical devices present in many homes. In contrast low carbon diagrams were about new technology, renewable of various kinds while fuel poverty messages were more often about new ways of paying for energy – both further removed from the already existing practices of everyday life than diagrams of comfort, cosiness and hospitality.

In light of this contrast between fuel poor and fuel rich households, it is apparent that comfort is not only a physical state; it is in important ways a socio-techno-economic

state. These three elements of comfort must be factored into any practices of comfort; it must be affordable in some way, it must be technically possible and it must make sense in relation to other new or previously existing ideas about energy use. This combination of the social, technical and economic leads to a complex array of different performances of comfort as a result of interferences between different overlapping and interacting diagrams, each only partially able to conduct practice.

The data suggests that achieving comfort is a hugely important component of energy use practices, and that very few individuals' ideas of comfort were significantly different from current governmental definitions of thermal comfort, a finding which resonates with Shove's suggestion that levels of comfort are moving at a societal scale (Shove, 2003). Further to the discussion above, however, what this study can add to Shove's argument however is that even in a variety of social, technical and economic contexts, where different infrastructures are employed, thermal comfort is taken to be a commonly understood, basic requirement of everyday life in the UK.

Although varied between households, these ways of achieving comfort were all processes that were repeated on a daily basis and in which relationships between individuals, their technical and economic situations had become fairly well established. The result of this reinforcement of domestic relations is that attempts to alter or interfere with these relations must fuse new preferred practices with pre-existing diagrams already actively shaping practice, rather than replace them. The durability of prior arrangements can be linked to the slow rate of change in some of the technical and economic conditions of the home, and examples include the diagrams of housing

provision and architectural priorities of the mid Twentieth Century, the assumptions made about the UK's domestic supplies of gas and coal that in the 1980s contributed to the actualisation diagrams of mass centralised energy generation via fossil fuel burning plants, and the diagrams of debt collection and credit restrictions of energy retailers who have deployed pre-payment meters to some of the most vulnerable homes in the UK. Similarly, fixed incomes such as pensions or benefits do not, by definition, change very much, and technologies such as fireplaces, boilers, stoves, lighting, wiring circuits are similarly (semi-)permanent.

In contrast to the speed of discursive shifts in governmental attempts to steer outcomes, the startling rate of fuel price increases and the lifecycles of certain items like light bulbs interact with these more slow moving phenomena and mean that to varying degrees 'new' hardware has to find ways to work with older items in an incremental process of change through the 'domestication' of new social and technical technologies rather than rapidly bring about step changes in energy use. Through the domestication process, discussed in Chapter Two, the inscriptions embedded in new technologies are modified through dialogue with other pre-existing ones. In the case of new light bulbs this is fairly straightforward integration, although the quality of the light they produce was found to lead some individuals to add new table lamps to a room in order to make up for the drop in light from the new bulb. In the case of 'technologies of the self' however (Foucault, 1979), such as advice from government institutions about how to use energy efficiently, or how to lead a 'greener lifestyle', these are de-scripted in the context of existing, deep rooted comfort and waste aversion practices which *more* effectively dominate the relations between the heterogeneous components of the domestic environment. The result is that discourse regimes such as the green energy use messages from government institutions fail to colonise the

domestic environment and instead can only hope to modify pre-existing patterns through socio-techno-economic negotiations.

4.6 Socio-Techno-Economic Practice

Researchers in this field have studied the 'barriers to action' (Hobson, 2003, p95) that prevent people from acting on their knowledge and values, and these insights into the barriers to direct adoption of new preferred practices offers new insight into what social scientists have described as the 'value-action gap' (Eden, 1998; Hobson, 2003; Barr, 2006). Macnaghten has argued that the rationalities of guilt and duty that information deficit approaches are based upon suffer from a '*lack of reach*' and are '*unable to permeate the sinews of everyday life*' (Macnaghten, 2003, p73) while Hobson develops Giddens' Structuration Theory (Giddens, 1984) to suggest that information campaigns fail to reach the '*practical consciousness'* which guides our everyday domestic practices. According to Hobson's application of Structuration Theory, our discursive knowledge of environmental issues, or energy affordability in this case, can be informed by media messages and information campaigns, but many of our actions are carried out at the practical level of consciousness, which is a kind of knowledge that '*enables individuals to 'go on' in daily life without having to make new decisions every moment… this is not simply a cognitive form of knowledge but is embodied and experienced in the flow of daily practices."* (Hobson, 2003, p104). As discussed in Chapter Two, Shove et al. make a similar argument, insisting that theories of practice must:

"...Overcome the limits of classical models of human action and social order grounded in the purpose-orientation of *homo economicus* or in the norm driven action of *homo sociologicus*."

(Shove, 2007, p12)

This research contributes to this debate by demonstrating that not only does everyday life take place outside of conscious reflection, it takes place in between people, ideas, economies and things. This is a perspective supported by Schatzki for whom practices result from the arrangement of people, things and ideas in such a way that "Each of these social formations comprises an arrangement of people in which they perform interlocking actions, are entangled in particular relations, and possess specific identities." (Schatzki, 1996, p15). Such a perspective is further defended by Reckwitz who describes practice as a "type of behaviour which consists of several elements, interconnected to one another; forms of bodily activities, forms of mental activities, 'things' and their use." (Reckwitz, 2002, p249). Energy use behaviours then are the embodied responses that take place between components of heterogeneous energy constellations.

This emphasis on the effects of factors other than rational calculation on environmental behaviour is becoming increasingly widespread in the social sciences where there is a growing consensus that barriers to action are more multi-faceted than a simple deficit in information. This developing body of work is particularly concentrated in contemporary behavioural economic theory which, contrary to neoclassical approaches, stresses the a-rational rather than irrational processes that animate social

life. Mullainnathan and Thaler describe behavioural economics as the investigation of '*what happens in markets in which some of the agents display human limitations and complications*,' (Mullainnathan and Thaler, 2000, p2) while the New Economics Foundation (2005) suggests in their advice to policy makers that phenomena such as habits, the behaviour of others, self-expectations, inability to calculate costs and benefits and the need to feel that their actions are effective are all important factors in people's likelihood of making environmentally benign decisions in their everyday lives and transactions. It is also important to note, as argued elsewhere in the thesis, that the limitations faced by agents are not just human as Mullainnathan and Thaler suggest, rather they are also technical and material.

Taken together these insights suggest that energy use practices are socio-techno-economic entities as they are structured by socio-technical phenomena as Shove (2007), Schatzki (1996) and Reckwitz (2002) argue, but also by the mundane economic aspects of everyday life that Lee (2006) insists bleed into ordinary practices such as energy use through the technologies, practices and structuring effects of markets for energy technologies and services.

Recent work by the Prime Minister's Strategy Unit (Halpern et al., 2004) and the Sustainable Development Strategy (DEFRA, 2005) signal that a less mechanistic conception of behaviour is emerging in policy circles (NEF, 2005). This Chapter argues that a wide range of factors interfere with the logics of responsible decision making disseminated through governmental messages with the effect that outcomes are determined by complex interactions between these social / discursive logics, economic

conditions and contexts and the technicalities of pre-existing diagrams of everyday energy use.

4.6.1 Unruly practices

The tendencies of socio-techno-economic relations to interact with one another as they get caught between governmental orderings make it likely that attempts to discipline practices of energy efficiency struggle to achieve a high degree of control over the everyday lives of individuals. This unruly element of everyday practice is emphasised by De Certeau in his key text on everyday practice:

"(The) goal is ... to bring to light the clandestine form taken by the dispersed, tactical and make shift creativity of groups or individuals already caught in the nets of 'discipline'. Pushed to their limits, the procedures and ruses of consumers compose the network of an anti-discipline." (De Certeau, 2002, pxv)

The quotation foregrounds De Certeau's recognition that individuals are 'already caught in the nets of discipline', they are already in previously existing patterns of practice as a result of the many organisational forces to which they are subjected. The imposition of new diagrams from government, commercial organisations, media, friends or elsewhere will at least lead to interference between these which will often lead to individuals pursuing "errant trajectories obeying their own logic... In the technocratically constructed, functionalised space in which consumers move about, their trajectories form unforeseeable sentences, partly unreadable paths across a space

... (which) trace out the ruses of other interests and desires that are neither determined nor captured by the systems in which they develop." (De Certeau, 1984, pxviii).

In the field of socio-technical studies of energy Lovell (2005) has developed a related approach to show that materials such as building fabrics, clothes and heating systems have real and unexpected impacts on the way individuals use their homes which can often have negative as well as positive effects on energy consumption:

"In practice complex, unexpected relations form between technologies and users, which can hamper the achievement of sustainability goals." (Lovell, 2005a, p15)

Bringing technologies and material fabrics of energy use into the analysis does not then necessarily lead to technological determinism, for as Lovell points out; technical scripting often has far from predictable outcomes (Lovell, 2005a). Rather it is only by appreciating the dynamic and unruly socio-techno-economic relations of energy use practices that we can begin to understand why policies and interventions designed to create particular low carbon or equity outcomes have such unpredictable results. Developing this argument that practices are not always determined by governmental scripts, Kaljonen (Kaljonen, 2005) has used the example of Finnish farming to show that policy ascribes practices onto farmers which farmers do not always accept. Rather than resisting, or adopting the subject position of 'slave' in a master-slave binary, they use a 'sentient-ecology' to renegotiate policy messages to arrive at practices at various points of equilibrium. This embodied, contextually specific knowledge is used to work with the environment in ways that governments find difficult. Kaljonen stresses the power of the local environment to shape the ways in which power is translated and

changed as scripts and technologies are de- or re-coded in different contexts, or ‘domesticated‘ and made to adapt to specific conditions in different homes (Silverstone, Hirsch and Morley, 1992). This is added to by Cantrill and Senecah, who argue that the 'sense of self-in-place' is a powerful force in determining how individuals relate to their environment. They explain that any suggestion that the individual is governed into ways of thinking and behaving neglect the ability of local settings to mediate competing discourses and ultimately guide individuals to contextually specific practices (Cantrill and Senecah, 2001, p185). Cantrill and Senecah are also of the opinion that the local non-human environment is central to the process of mediating the power of discourses, strengthening the argument presented here that practices are the outcomes of interactions between humans, nonhumans, ideas and places:

“...There is an emerging recognition among social scientists that as people develop a sense of self, their perceptions of ‘place’ serve as potent mediators of the degree to which they embrace conservation-oriented practices (for example, Massey, 1994; Williams, 1995; Schroeder, 1996).” (Cantrill and Senecah, 2001, p185)

These insights into embodied and locally determined practices are useful in the context of energy efficiency research as they build on Geuring et al.’s conclusion: *‘Variables from the natural, the social, and the designed environments and human organism variables interact to affect energy consumption’* (Guering et. al., 2000, p48). Guering et al.’s review of models of energy consumption since 1975 concludes that the rational actor central to such models is a fiction, and that a more ecological approach, which

takes the body-in-interaction seriously and which recognises the potency of factors such as folk knowledge and technical limitations is critical to achieving reduced energy intensity and wellbeing.

Building on this, the chapter argues that the division between discursive attempts to conduct energy use practices and the powerful effects of domestic economies and technologies, too often thought of as a backdrop to the 'real' stuff of social life, can be collapsed. The chapter argues that governmental discourses used to steer practices are not phenomena of a different order to practices themselves. That is, this research integrates a Focauldian approach to diagram actualisation through discourse construction with a materially attuned study of everyday life by focussing on the practices involved in each. Governmental discourses can only be developed and translated and power exerted over space through practices, entities made up of technologies, people, bodies and habits and ideas. It is in the interactions between the governmental and the domestic that energy use practices exist and, importantly, can be modified, changed or adapted.

The next part of the chapter uses this discussion of governmental practice to analyse the means through which individuals are connected to governing agencies and the ways in which new socio-techno-economic arrangements might be actualised.

4.7 Technically and Commercially Mediated Governance

"We do what we can afford and what fits into our lifestyle but if someone was to come along and say you can do this, this, this and this, I might say OK I can't do that, but I can do that and that." (Mr and Mrs AS, couple, living in housing association property, pensionable age, low income, low wealth, terraced property, insulated loft, new boiler).

Disengagement from government observed earlier in the chapter and the priority attached to the economies of energy use has encouraged analysis to become attuned to a different set of relationships that connect householders to the wider socio-techno-economic energy networks. This section looks in more detail at how individuals engage with government and energy businesses, and the ways in which attempts to script practices are received through technical and economic channels. Secondly it interrogates the data regarding the way that householders decode governmental scripts in particularly economic ways and pays attention to the ways in which these engagements are technically influenced and so unfold differently in different socio-techno-economic contexts rather than being homogeneous outcomes of linear discursive trajectories. The section is sub-divided to deal with the technical aspects of individuals' relationships with energy governance agencies and energy economies in turn before reflecting on the distinction between governmental agencies and economic ones.

4.7.1 Technical Contingency of Energy Use Practices

“GP: Could you talk me through how you ended up with this stove?

Participant: Friends of ours had a gas stove which we liked and we decided that we'd put a stove in the living room in this central chimney. We didn't know how to get gas into here though because it’s a stone hearth, and we thought we'd go for solid fuel. We just looked at the spec for it and worked out whether it would heat the room, so we did a bit of physics.”(Mr and Mrs P, married couple, private home owner, working age, high income, high wealth, detached property off gas grid. Well insulated heated by gas stove).

“(If prices go up again how will you respond?) It depends. If this job goes well, it’s only 16 hours a week but it might go up to 20, then I might change them over (have the heaters linked to the open fire). I know Eden Housing wouldn't do it but I might pay someone to do it myself, if it would cost £2-3000, because I can see myself being here for a while, then it might be cheaper for me in the long run. I'd have to calculate whether the initial outlay is actually going to save me over the amount of time I'm going to be in the property, because it’s not my property. If it was my property then it'd be a completely different calculation. If they move me to Penrith or if I lose the tenancy, whatever - if difficulties came - then I've lost the money I've spent and it hasn't spread over the time I wanted it to. If the property was my own and I'd spent the £2000 and that happened to me then I'd still have the property to sell, which having that energy saving investment I might get back in the sale because it'd add value onto the house. I'd get the money back regardless.” (Jackie, single parent, living in social rented accommodation, working age, low income, low wealth, terraced property, wall insulation, old inefficient boiler)

“(Why have you decided to replace the boiler now?) I'd like to do it before the old lady (the existing boiler) goes. I don't want that boiler to go down and for us to be in a rush to get a new one... I'm leaning to getting one now though because that one has been in there since 1979, 27 years now. ...We are going to get a boiler this year, she’s (the boiler) pushing me that way.” (Mr H, married couple, private home owner, pensionable age, middle income, high wealth, semi-detached house, loft and wall insulation, old gas boiler)

“(GP - Any problems?) One problem is that it’s so bloody expensive! Yes oil is expensive. I hope it’s just gone down because petrol and gas have. … If the price of oil keeps on going on it'll be awful, it’s the worst thing about living here. If money was no object I'd have it running all day, across the whole house too, because it doesn't do the house much good to have it off.” (Mrs C, married carer, private home owner, pensionable age, low income, high wealth, large detached property off gas grid. No insulation).

“(Our supplier) informed us the bills were going up, but we heard on the news that they all were. I went on the internet, on U-Switch.” (Ms h, co-habiting couple, , private home owner, working age, high income, low wealth, terraced flat, no insulation, old boiler)

This first set of quotations provide an insight into how individuals' conception of their agency in becoming more or less energy efficient is bound up with the technology and economic circumstances they live with and, more specifically, the opportunities it presents or prevents for them to 'be otherwise'. Participants reported that their greatest opportunities to be more energy efficient were when they were able to make purchasing decisions, and that those moments of engagement came when technologies they used became faulty, unreliable, or obsolete. While behaviour changes can and do occur outside of technical changes, the data suggests that most powerful ways to create new practices are to use hardware, such as new boilers or appliances, to precipitate modifications in practices by disturbing habitual 'practical conscious' (Giddens, 1984) actions. During these in-between states, when habits become loosened from their physical performances due to their dislocation from the technologies with which they are co-performed, there are opportunities to re-configure practice around more energy efficient 'hardware.' (Walker and Cass, 2007)

Such opportunities are themselves also technically informed. The options available at each engagement moment are determined not by attitudes of individuals or the degree to which governmental discourses have been successful in modifying attitudes, although these will undoubtedly influence the choices made from the available 'menu'. Rather, the contents of the menu of options available to each consumer at each transition moment are determined and edited by the technical feasibility of installing different systems in particular contexts and what is practically available to individuals in their market spaces, whether these spaces are local, national or international. These factors influence not only the energy efficiency of available options, and therefore

possible future energy use practices, but more crucially the economic, social and environmental costs of living in the post-purchase scenario.

4.7.2 The Actancy of Access to Financial Technologies

“We've been aware of the price rises but our direct debit has not really gone up that much. It’s not an issue - I can't see us turning it off to save money. We might turn it off to save energy if it’s wasteful but not to save money.” (Mr and Mrs PG, married couple, living in housing association property, pensionable age, low income, low wealth, semi-detached property, loft and wall insulation, new boiler)

“I suppose there's been a price rise, there's been a few but I must be the only one who doesn't complain to British Gas. I pay by direct debit all the year through and pay exactly the same all year. This winter I'm in credit, so I never complain. British Gas knocks £30 off your bills every quarter if you're on Pension Credit, so I get that, plus I get the £200 so I'm the only person in the country who doesn't complain.” (Ms R, single parent, living in housing association property, pensionable age, low income, medium wealth, terraced property, insulated loft, new boiler)

The above quotations reflect a theme that emerged in the interviews about the benefits of paying fuel bills by direct debit. For those able to access direct debit a significant number of participants who paid by direct debit, 15 out of the total 41 householders, reported feeling satisfied with their energy bills and energy supplier. Direct debit

allowed them to budget for the energy and remove the uncertainty and irregularity of other means of paying. In particular it helped them to manage their domestic budget by removing seasonal peaks and troughs. The second quotation also mentions the winter fuel payment that certain eligible groups receive. The winter fuel payments of between £250 and £400 (depending on eligibility criteria) are paid by the government directly to householders at the start of each winter. While these do not accurately target the fuel poor and are not always used to pay fuel bills as a result of them being paid in the months preceding Christmas, they are evidence of a genuine effort being made by government to respond to fuel poverty, albeit a blunt and imprecise response. Other participants however felt differently about their payment technology. This next quotation is from a participant who changed their billing system in order to avoid some of the pitfalls of prepayment meters but it illustrates some of the tradeoffs made when choosing a payment technology:

"(Talking about bills) The gas thing, I really find confusing. We do pay attention to them, they are going up, but we pay by direct debit …. When we first moved in here there was a pre-payment meter and that was horrible, It never seems to last very long, never as long as you thought and sometimes you'd run out on a Sunday and all the shops selling the cards would be shut so you had to do without. We just panicked, if we got down to £3 and we wanted a bath or something. Although I can see it'd be handy to see how much you've used." (Ms F and son, single mother with one son, private home owner, working age, low income, low wealth, semi detached property, not insulated, new boiler).

While some participants were keen to talk about the disadvantages of prepayment meters others were unhappy with direct debit, such as this participant:

“My son is always in negotiation with them over the level of the direct debit. They always play safe and it’s always on their terms. They are prepared to let our credit build up in their coffers but they're not prepared to let us carry it over. If we made a concerted effort to save fuel we wouldn't see any money back for quite a while. Eventually if you natter at them they'll send a cheque but they're very slow to do that.” (Mr G, single person, living in private rented accommodation, working age, middle income, low wealth, purpose-built apartment, wall heaters, fully insulated from new build.)

The actancy of financial technologies in influencing engagements between individuals and markets is considerable, as the above quotations illustrate. Payment systems have a considerable effect on fuel prices, and consequently, fuel poverty. There are several ways to pay for domestic energy, but the starkest differences are between Direct Debit and Metered payment. For those paying by direct debit there is a sense of distance or alienation between energy use and energy payment. Using direct debit or quarterly billing makes it difficult to know how much different appliances or comfort practices, such as running a bath or cooking a roast dinner, cost. With this comes a sense of distance from savings, so the feedback loops that might reward an individual for reducing energy use are dampened by quarterly billing, monthly standing orders as well as inaccurate or estimated meter readings. Conversely, for those on a pre-payment meter or top-up card the situation is very different. They have immediate feedback

from their credit meter which enables them to become very skilled at judging how much different activities cost and being able to modify their energy use in response to costs.

The feedback loops also enable energy practice modifications precipitated by attitudinal or technical changes to be converted into financial savings very quickly and easily. There are seriously problematic aspects of pre-payment metering in England, Scotland and Wales however. While Northern Ireland, where the retail market is differently structured, has adopted a smart metering system which gives a discount to customers using two way smart meters (because of the reduced costs usually associated with meter reading and complaints), elsewhere in the UK customers using a pre-payment meter are excluded from a 10% discount to which direct debit customers are eligible. Furthermore, when energy prices fell in 2007, after their rise in 2006, direct debit prices fell by considerably more than pre-payment prices. The result was that those with a meter were, and in many cases still are, paying up to £185 per year more than direct debit customers (FPAG, 2007). Direct debit then is significantly rewarded as it not only reduces costs but also guarantees payment. Access to it however is both technically and economically restricted. Direct Debit requires a credit account so those in financial difficulty or with poor access to credit are penalised. Secondly the prepayment meters still exist in their millions. In Northern Ireland the new two-way meters have enabled discounts and direct feedback but until the meters are adopted by the major English suppliers and are installed throughout the country there is a technical sticking point which has until now allowed suppliers to differentiate their customers on the basis of the meter being present, and exploit the

position of those unable to access direct debit. Removing the meters is not hugely costly but until it is done, or until tariffs are re-calibrated to remove the inequality between these techno-financial means of paying for energy, both energy use practices and energy bills will be at least partly shaped by the presence or absence of a particular kind of payment technology.

These data illustrate the effectiveness of technical settings and financial systems in affecting how individuals engage with other energy organisations, and how these technical and economic factors have the capacity to influence the creation of energy use arrangements and practices. The following section examines the nature of the organisations that households engage with and the functions they perform.

4.7.3 Combining Governmental and Commercial Engagements

The data below is analysed to scrutinize the various ways engagement with energy governance networks are at once commercial and governmental. The first quotations refer to various schemes in which products are subsidised or promoted and are designed to precipitate new more sustainable resource use practices but which are delivered through market based channels. They highlight the pragmatic blurring of ideological lines between the state and the market:

"…Then there's the compost bins you can buy from the council. Every so often they send out a leaflet saying would you like to buy one – they're very heavily subsidized."

(Mrs G, single person, private home owner, pensionable age, low income, high wealth, semi-detached house, solid wall, old boiler)

"GP: What could be done to encourage you to make more changes?

Participant: Make information more freely available, and whatever it is you need, say if its low efficient light bulbs, making it the same price as ordinary things, I'm sure that's something the government could do." (Mr and Mrs SC, married couple with kids, private home owner, working age, middle income, middle wealth, semi-detached house, solid wall, old boiler)

"GP: How did you get your wall cavities filled?

Participant: We got a thing from the council, or was it? I'm sure it was the council. Or was it E…. Not NEA, … EAGA. We either got it through them or them and the council and the offer was that because I'm 60 we got it for £100. Which is great, it'd cost £2-300 for a house this size. We have seen a change in the two winters." (Mr and Mrs TO, couple, living in housing association property, working age, low income, low wealth, terraced property, insulated loft, new boiler).

These responses, among many others, suggest that governance functions are unavoidably economic functions in energy networks. They point to a sense of confusion over how to get the best out of the current market and governmental offerings and a need for governmental actors to intervene to assist individuals in

getting the energy efficiency market to work for them. Other responses to questions about making sense of energy decisions, such as those below, suggest that businesses are playing just such a role in governing domestic energy use by providing advice specifically attuned to the needs of individuals, where traditional government institutions are not. The micro-businesses mentioned, local gas fitters, local boiler sales teams, and the local arms of larger businesses such as EAGA PLC, are able to provide the customised information and advice that individuals need in order to navigate what is a highly complex series of options. The majority of conversations with participants about the roles of businesses in providing tailored assistance were positive, and further supported the emerging conclusion that energy practices are in many ways experienced as economic practices. Furthermore, businesses acting as surrogate governing agencies, providing welfare advice as well as making a profit, seem to be accepted as unproblematic by individuals. The data analysis supports this, suggesting that local commercial actors were seen to be more responsive, more trusted and better able to deliver solutions than governmental institutions, and that they were appropriate surrogate performers of functions more traditionally ascribed to government institutions.

As well as providing individually specific technical advice on how to integrate their existing home and energy systems with ambitions of reducing waste, being more comfortable, reducing expenditure or being 'green', these functions also included advising people on 'what is best for them in their home' even if it meant challenging individuals' own opinions and providing solutions for individuals which might reduce the company's potential profit. Many participants did not see commercial

organisations as exploitative profit maximizers, but instead regarded them as organisations that were *also* part of local energy economies with whom they could trade and who were able to help them achieve their energy use goals. This different perspective on commercial actors in energy networks is an important finding of the thesis. It encourages a pragmatic approach to state – market – individual/consumer relationships in which ideological divisions and preconceptions give way to a socio-techno-economic context specific analysis of who can achieve what in the given circumstances. Furthermore it suggests that individuals do not separate out the state from the market or the economic from the governmental in the way that social and economic sciences have tended to. A resulting conclusion to draw from this is that it is a *more* integrated approach to energy use and governance which includes the economic and governmental aspects and logics of hybrid organisations in the analysis of how energy efficiency is implemented.

Furthermore, this discussion of the ways in which individuals engage with other energy network actors leads to a second conclusion; that conceptions of relationships between governance actors and individuals must recognise that engagements are enabled, structured and differentiated by technical components of energy systems, as well as mediated by commercial actors. More accurately, practices of engagement are structured both by discursive framings *as well as* very powerful techno-economic factors, and, as such, must, like practices of energy use discussed above, be thought of as socio-techno-economic entities. Thinking of energy use governance as a purely state-discursive project, as has been the case in much of the policy studies literature which has under-analysed the economic and technical aspects of governmental projects

(see Chapter Two's discussion of the governance debates), is too much of a one dimensional approach. Not only are people less likely to respond to information based messages about cost and energy saving than previously imagined by information deficit models, but they are actually prevented from transforming their practices along discursively defined lines by the hardware in their homes.

Furthermore, energy use is always economic but the most powerful opportunities to engage with individuals and have real influence over their practices are found at purchase decision points, when old 'things' are about to leave the home and new 'things' are about to enter. Both fuel rich and fuel poor households interviewed were most likely to engage with energy services markets, and indirectly with government, as consumers demonstrated a capacity as well as an inclination to carry out variously complicated calculations in order to get the best deal for themselves. While the products and systems individuals are able to choose cannot allow governing agencies to perfectly script behaviour, when they are changed or become problematic, they do create moments at which new sets of relationships can be configured, new practices made possible. Following from this, performances of economic agency can be seen to offer opportunities for effective intervention which can be economically, technically and discursively attuned to the needs of individuals who are not entirely defined by their economic behaviour, but whose economic priorities none-the-less present governing agents with tactical repertoires to work with.

Most critically of all, the data analysis and the work undertaken over the course of the project suggest that while individuals enact economic rationalities, these are

complicated by the social, technical, governmental and market place contexts in which they are located. Differences between local authorities and between the technical conditions of areas, streets and houses mean that the responses from government need to be flexible and multi-faceted as well as readily accessible and easily understood. Achieving this multi-angle but single-point response strategy is returned to in Chapters Five and Eight.

4.8 Conclusions

Returning to conceptions of everyday decision making found in literatures of practice and environmental behaviour, the analysis makes four valuable contributions to the field. Firstly, people make decisions based on their physical engagements with their home environments in order to achieve comfort or to perform narratives of waste aversion and financial management. Considering practice to be a series of embodied socio-techno-economic responses to specific domestic contexts supports the idea that in order to encourage people to modify their energy use in environmental or affordability ways efforts must be made to engage with them in more than discursive ways; changing practices then requires re-structuring socio-technical settings.

Understanding how this might be done leads to the second contribution. Recognising the actancy of technical components and economic aspects of domestic energy systems is key to understanding the ways in which attempts to discipline energy use behaviour inevitably produce several socio-techno-economic practices which constitute the various, often overlapping ways in which people achieve comfort, waste aversion, or

financial management. In order to understand why and how people go about using energy, analysis must be attuned to local, even individual configurations. What does become apparent in noticing recurrent themes in encounters with participants however, is that the most powerful factors animating achievements of comfort, waste aversion, and financial management originate within homes, between human bodies and technologies and domestic economies, rather than in remote calculative centres who through techno-economic mediators try to bring about particular practices. For those whose responsibility it is to steer domestic energy networks toward different states of interaction, any attempt to do so without reference to the particularities of technical and economic aspects of everyday life is certain to be muddied and made even less precise by the refractions and counter-flows stemming from home energy situations. From this perspective then, practices are not simply enactments of governmental discourses; rather they are influenced by the several scripts written into various technologies present in homes. Furthermore, governmental discourses will be domesticated and re-written in reference to already existing, more local and more powerful relationships in homes. Domestic practices then can be partly disciplined and as such are sites of political steering and control, but it is also important to recognise their political potential to combine orderings, various different disciplining efforts, in contextually attuned, spatially different ways – as in the case of waste aversion and energy efficiency.

The third conclusion is that while we might now find it old fashioned to suggest that humans make rational decisions based on knowledge it is entirely appropriate to insist that economic decision making is a condition of contemporary market infused

governance networks. The outright abandonment of rational economic decision making in favour of exclusively embodied sentient decision making might be conceptually attractive, but it would also be a step too far. In a practical sense, individuals are in very real ways in economic networks and their financial security has been shown to be almost as important to them as their bodily comfort. Attempts to analyse energy use that do not refer to the mundane economic predicaments with which it connects are as insufficient as those which do not recognise its more-than-rational aspects; practice-as-entity must be an economic as well as technical and embodied entity. The conclusion which results is that economic decision making is part of a way for governments and researchers to access energy use practices, while accepting that to imagine individuals as the self interested rational actors of RCT is too convenient, too lazy a formulation. Individuals do want to save money, particularly those who do not have much of it to begin with. With this in mind, working creatively with householders to change the mundane everyday economics through re-structuring tariffs or energy retail conditions might be the single most effective way of getting access to the prosaic but powerful nature of energy use practice.

Finally then, practice entities are bound to the conditions of possibility of socio-techno-economic arrangements within homes, but, as discussed in Chapter Two, they are the products of overlapping diagrams; socio-techno-economic arrangements are hybrid phenomena. Because governmental diagrams, socio-techno-economic projects informed by notions of climate change or fuel poverty with all their associated discourses, economies, and technologies, only partially exhaust the capacities of the components they entangle and because these latent capacities are employed by other

orderings such as, for example, the need for thermal comfort, they create the potential for practices which are the complex and unpredictable products of several overlapping diagrams. Continual problems such as low take up of energy efficiency grants or the 'incorrect' use of new technology are key research challenges in the field of energy efficiency and the chapter suggests that the processes that make practices swerve away from expected or scripted pathways might be illuminated by taking this thoroughly socio-techno-economic approach to the practices that are distributed within and between governmental diagrams.

The next chapter investigates these issues further by interrogating the connections between the household practices studied here and the intermediary agencies that align, combine and connect governmental projects with domestic priorities. Having analysed the contested practices of householders, and discussed their engagements with and disengagements from actors and agencies, the thesis moves to a new research site in order to understand the characteristics of those agencies in between policy and domestic practice and to illuminate the various factors which structure their work.

Chapter Five: Niche Hybrid Entrepreneurs in Sub-National Energy Efficiency Governance

5.1 Introduction

This chapter responds to Chapter Two's discussion of the challenges of everyday energy use by analysing how the organisations acting as intermediaries between householders and the national state institutions operate and with what effects. As the chapter progresses it examines the process through which outcomes for households are structured by both the specific socio-techno-economic contexts in which they operate and the conditions of possibility framed by national level policy.

The conceptual work undertaken in Chapter Two to integrate the work of Foucault and that of Latour, Law, Barry and Callon enables this chapter to study the 'hows' of this process rather than just the 'why' – it enables us to study the practices of energy governance rather than just the project (Murray Li, 1999). While the other chapters take the perspective of the local / specific (Chapter Five), and the centre / national (Chapter Seven) this chapter focuses on the relay points between government institutions and their subjects to study how their various objectives are aligned and misaligned. In particular the chapter considers the coordination of the major energy

efficiency programmes in the UK, which were introduced in Chapter One, and examines the ways in which fuel poverty and carbon reduction projects which they mobilise are coordinated in different geographic areas of England by actors in different sub-national governance settings. The chapter draws on three area based studies, in Newcastle Upon Tyne, the Metropolitan Borough of Kirklees and the Eden District in Cumbria, to examine the different governance networks that result from the interaction between various attempts to actualise national level governmental diagrams of low carbon emissions and reduced incidence of fuel poverty in UK homes. Two phases of this integration are identified in the analysis, and the possibility of a third discussed.

Central to the chapter is the concept of niche governance entrepreneurs (NGE) which is critical to an understanding of the kinds of agencies that are doing this work of alignment and combination. The chapter uses this concept to analyse how and by whom flows of national policy into local settings are imperfectly aligned with pre-existing or competing projects, practices and socio-techno-economic conditions which powerfully shape the different manifestations of governmental diagrams. This leads to an analysis of the capacity of the UK government to determine the outcomes of its energy programmes and their reliance on NGEs to negotiate compromises between policies, priorities, people and places.

5.2 Local Coordinators as Niche Governance Entrepreneurs

The previous chapter suggested that householders had in many ways withdrawn or become disengaged from state institutions, particularly the national government, and

that a growing number of commercial or quasi-commercial agencies were providing services in ways that were more than commercial. Such agencies are central to the energy efficiency activity currently underway in the UK as in many ways, as will be examined in this chapter, they connect the national government's energy projects with the specific demands of householders and communities. Typically in the UK energy efficiency sector these organisations will be the sites at which climate change and fuel poverty policy projects are fused together, often meaning that the coordination of the policies will be commercially contingent as is developed below. At this stage though, before scrutinising the effects of their work, it is necessary to understand how they fit into the conceptual framework developed in Chapter Two. That is, it is necessary to be clear about the role they play in mobilising, modifying and manipulating governmental diagrams and achieving results on the ground in the shape of providing insulation, heating, damp proofing and advisory services to householders.

In Chapter Two the argument is made that an analysis of the practices of governing energy efficiency, how the idea of a low carbon everyday life or affordable energy are actually achieved, is essential if we are to adequately respond to the research questions which shape the project. Responding to that challenge means focussing on these intermediary organisations and the work they do. Doing so has led to the development of the concept of the Niche Governance Entrepreneur (NGE).

5.2.1 The Niche

To describe the policy coordinating activities as niche activities is to signal a frame of analysis heavy with economics. Despite its origins in ecology (from the Latin, 'nider' for 'nest') where it is interestingly defined as a situation in which '*each species is held by its structural or instinctive limitations'* (Vandermeer, 1972), in economic theory the niche represents a very different set of phenomena. It is a place of opportunity, a starting point. The niche is somewhere, a location often imagined as being within the coordinates of an established market, or at its periphery. Crucially, the niche as it is imagined in economics, is only possible in the presence of a problematic market structure.

As work on the performativity of markets (Mackenzie, 2007; Smith, 2005) has suggested, however, the market need not be thought of as a pre-existing macro structure or container for economic activity, but rather a field of socio-technical relations which, through various means, are able to achieve a state of durability which gives the appearance of structure and permanence (Callon, 1992, Mackenzie, 2007). Slater (2002) notices the similarity between this deconstruction of the economy with the Foucauldian concept of governmentality in which government is deconstructed by many scholars and, as suggested in Chapter Two, it is necessary to think of government being the *work* of a wide range of actors enrolled in political and policy processes as well as the 'missing masses' of technologies and objects which have been largely excluded from our understanding of "the space of government" (Barry 2001, p2). This change in how we perceive structures such as 'the market' and 'the government' allows us to think about the niche differently.

When studied relationally rather than structurally, niche phenomena are conceptualised as part of the generative exchange that occurs when circulations between actors and actants who are otherwise enrolled in 'market' and 'policy' framed networks breakdown, when limbs of networks become stray and when omission and overlap create opportunity. Furthermore, Latour describes actor-network-theory as being about bypassing rather than resolving the double dissatisfaction faced by social scientists trying to come to terms with micro and macro phenomena, or structure and agency (Latour, 1999). It would seem that the niche is a particularly useful way to get into the circulations between the forces and rules around which practices are structured, such as notions of policy and markets, and actors, such as businesses, civil servants, energy practitioners and householders; it is a site of '*oscillation'* (Latour, 1999, p17) where regulation and governance structures meet the immediacy and flexibility of enterprise, practice and lay expertise. It is a crucial point of relay.

While policy design and delivery become increasingly complex in contemporary settings, and self-consciously so, the niche acts as a point of connection, where multiple lines of agency intersect or are alienated and where the unpredictability of policy processes invoke the emergence of new hybrid forms of policy delivery and feedback. Importantly, the niche is also a site at which more than one policy project becomes actualised. A criticism made of governance literature in Chapter Two is that even the more sophisticated accounts of governance such as Hajer's Discourse Coalitions, analyse the "actors sharing a (single) social construct." (Hajer, 1993, p46) This project's focus on the coordination of constructs such as fuel poverty and carbon

reduction has, however, highlighted the tensions between different national policies which may be co-present yet disconnected in sub-national spaces. The chapter argues that they can be made to interact in new, creative and generative ways by agencies recognising this disconnection as an opportunity, as the analysis below illustrates.

Previous studies of socio-technical change in the energy sector have also used the concept of the niche. Typically the term has been used to describe the opportunity presented by innovative, often low carbon, technologies, to lead to changes in wider socio-technical systems (see Geels, 2004), and research has tended to focus on how the technical 'lock-in' created by the durability houses and infrastructures, etc. can be overcome where governments are able to successfully nurture niche technologies (Hughes, 1983; Rip and Kemp, 1998). More specifically, the term 'innovation niche' is used to refer to "small-scale learning spaces for new technologies, which comprise either a single experiment or project, or a cluster of several experiments (Kemp et al, 1998; Rip and Kemp, 1998; Rohracher, 2001; Schot et al, 1994; Smith, 2003; Weber, 2003; Wiskerke, 2003)." (Lovell et al, 2009, p103).

A related term used in socio-technical studies of energy governance is 'Strategic Niche Management' (SNM), which is used in the literature to develop an analysis of governmental attempts to protect and nurture such innovation niches in order to bring about wider changes in the energy sector (Walker et al., 2006). In a discussion which draws out tensions with the concept, Walker et al. describe SNM as follows:

"SNM puts forward an approach to affecting the first stages of transition management through the 'planned sequential development of protected spaces for the development and application of a new technology.' (Kemp et al 1998) Within such niche spaces experiments with different technologies and institutional and infrastructural configurations are carried out, supporting networks and constituencies are established and learning processes enabled." (Walker et. al., 2006, p1)

Lovell argues that ideas of SNM have overstated the ability of governments to orchestrate the complex activities which take place and emerge in such conditions; "In general terms, the role of government in strategically managing socio-technical change is portrayed as largely unproblematic and unpolitical (see, for example, Rip and Kemp, 1998; Weber, 2003; Wiskerke, 2003). ... Further, it is assumed that governments are able to make strategic decisions about system change and that they have the power and political will to do so (Schott, Hoogma et. al, 1994)." (Lovell, 2007, p37). Lovell joins Smith (2003) and Shove and Walker (2007) in questioning this notion of the niche as an unproblematic mode of precipitating well defined outcomes, and both agree with Mitchell (2008) that progress achieved through SNM in the energy sector has been incremental and conservative.

The argument developed in this chapter, however, is that niches in energy efficiency governance are not only about developing and nurturing technological innovations

such as low energy appliances and micro-generation technologies. The analysis below suggests that geographically specific locations at which circumstances are such that new formations of, in this case, governance actors, funding streams, businesses and communities are made possible and are commercially as well as governmentally incentivised can be usefully conceptualised as niches. The outcomes of the arrangements created through such incentives are not limited to technology development and diffusion but they also include new politico-economic arrangements. With this in mind, the concept of the niche can be employed to provide an insight into the effects of the inability of national policy instruments to comprehensively determine local outputs and their ability to precipitate the emergence of new, varied, local solutions, i.e. ways to fill local governance gaps. This analysis is developed below, but at this stage of the discussion it is important to clarify the usage of the concept of the niche in this context - as sites of political and commercial as well as technical innovation which lead to new commercial-governmental practices, alignments and alliances.

In local energy efficiency governance circumstances exist in localities which present both commercial opportunities for economic actors and political opportunities for governing agencies. As a result, it becomes appropriate to think of many local energy efficiency arrangements as, potentially, niches of a different kind: sites of structural failure, where previously and contemporarily constructed political projects end as well as sites of overlap between co-present attempts to structure relations around different objectives; climate change and fuel poverty being the examples focussed upon here. Lovell et al., support this interpretation:

"Niches have the potential to act as crucial sites of policy change, not just technological innovation, because they provide a nucleus around which inconsistencies in multiple storylines emerge, and alternative visions are able to be voiced. … We therefore suggest that policy innovation is an important aspect of niches - niches are not just about the demonstration of specific technologies and prototypes (Rip and Kemp, 1998; Schot et al, 1994; Szejnwald Brown et al, 2003) for it is within niches that new policies and practices are implemented and conflicts within storylines can be voiced - conditions that are amenable to policy learning and change." (Lovell et al., 2009, p103)

This point about niches being points at which inconsistencies emerge to how the term is used in analysing the data below as the empirical evidence gathered for this project strongly suggest that national policies for domestic energy efficiency do indeed leave central state interventions disconnected. Furthermore, this disconnection has effects in localities and creates the conditions in which combining and aligning these instruments with local demands is incentivised. The EEC / CERT, the Decent Homes Standards and Warm Front in particular exist independently, as climate change and fuel poverty policies respectively, and the national government does little to make them interact:

"It's not for us to say how they'll work together. I mean we know how it's been done in the past and what's happening out there now but that is not something we dictate. ..." (DTI, PM)

"GDR: (referring to coordination) "We'll set a framework and set the ability for things to happen. We'll try not to be restricted in how we do things. We're not trying to say that you have to follow route a, b, c to get there." (DTI, PR)

The work done to make the three major policies work *together* and to work *for householders* is done by organisations who are able to respond to the various opportunities structured by the policy processes, which are the focus of Chapter Six, and combine them in ways which are practical given the way in which their possible activities are structured by the socio-techno-economic conditions of their specific areas. This fusing of policies and of economically, technically and governmentally structured opportunities creates the possibility for new power relations to emerge and develop. So, in this way, the niche can mark the extinction of certain lines of power and the ignition of others. This bottom-up niche recognition and activity performed locally is in contrast to SNM's top-down managerial perspective (Smith, 2006).

5.2.2 Niche Governance Entrepreneurs

"The (project) pulls in additional funding into the area, from the Warm Front scheme, the energy suppliers' Energy Efficiency Commitment programmes and other sources such as European funding, and the recent evaluation of the pilot areas by the Energy Savings Trust identified that the (project) increased the energy efficiency activity in the area by a factor of three. The (project) also increases local employment opportunities ... With the assistance of local authorities and other key partners we

would like to develop the concept and spread (the project) to much wider areas and deliver energy efficiency improvements and affordable warmth to more low income and vulnerable households." (Government Contractor, JC)

"It's what you do with the funding. When I started we had £10k – enough for my salary for 10 months and that was it. End of story. If I hadn't gone out and got the money... It's how you bring stuff together, you have to be creative about how you bring it together and make it work. It's like having a small business." (Enterprise, SB)

Material such as this suggests that governance actors operating in such niche environments in sub-national energy efficiency can seek both the social / environmental outcomes of traditionally understood policy entrepreneurs (see Rip and Kemp, 1998) as well as the development of their business interests. The opportunity structures framed by policy makers are calibrated in such a way that they very often create the incentive to either minimise costs or to start, sustain or grow a business, as made clear in this interview excerpt:

"GP: in terms of (your organisation) – what are the medium to long term goals? What will you be doing in 5 or 10 years?

Participant: I think it will be operating as a business; in a more commercial set up. Probably still have some support from local councils etc. It is a not for profit but it will be run in a more commercial way. Ideally it will both work as a business service and be involved in projects like the climate dome. Also it will be involved in projects that

involve policy change ... You know, we'll be providing services on a number of levels: communication, services to business, providing solutions for individuals, and also policy. That's the aspiration." (National Enterprise, CH)

It is through creating the potential for this economic advantage that flows emerge that transport materials, technologies, people and discourses in various patterns of relation. This can be seen in both the coordinated implementation of the EEC and Decent Homes Standards by local niche energy organisations and in Warm Front which has been central to the establishment and explosive growth of the UK's most powerful energy efficiency business, EAGA PLC. Evidence of the commercial potential of fusing policies together in this kind of way can be no more convincing than the case of EAGA PLC which began life as a not-for-profit entity set up to administer the Home Energy Efficiency Scheme (the predecessor to Warm Front), as no other organisation had come forward to tender for the work. Since then it has gone through various transformations to become an extremely profitable business which in 2007 was floated and valued at over £600m (figures from interview with senior director). While EAGA has a large charitable trust which continues to perform the community service element of what the organisation was originally created to do, the firm is explicitly 'hoovering up' (from interview with senior director) other energy businesses in an aggressive acquisitions based business model which has led it to be not only the government's preferred provider of energy efficiency measures, but it has become the preferred provider of the 'digital switch over' in the media industry, has contracts for public service operations internationally, and is a leading provider of CERT / Decent Homes installations as well as its contracted Warm Front ones.

While not all are as commercially successful as EAGA, the presence of social enterprises of various descriptions is indeed unavoidable in the energy efficiency sector in the UK, and several variations of not-for-profit businesses as well as profit making businesses with significant charitable and social responsibility facets make up a large part of sub-national as well as national policy networks. A common feature of these enterprises is the presence of an entrepreneurial figure driving the organisation forward who is attuned to and motivated by the opportunities presented in niche circumstances. Each entrepreneurial organisation interviewed was led by, or had been founded by, a single entrepreneurial individual who had brought about a change in culture in the organisation from a public sector service to a commercial culture in which risk, reward, and work styles were significantly modified. This is supported in Lovell et al.'s analysis of niche activities. They found that in "instances of policy convergence … niches are typically driven by entrepreneurial actors who are relatively independent of the incumbent regime." (Lovell et al., 2009, p103)

The concept of the entrepreneur has been discussed at length in business literature, dating back at least as far as Hayek (1937) and Schumpeter (1911[1934]). The characteristics of enterprise, innovation and entrepreneurship are subject to many competing interpretations, but Acs et al. (2006) support the data found here by arguing that the most popular conception of the entrepreneur found in related studies is that the entrepreneur is an individual rather than an organisation:

"Entrepreneurial activity depends upon the interaction between the characteristics of opportunity and the characteristics of the people who exploit them. Since discovery is

a cognitive process, it can take place only at the individual level. Individuals, whether they are working in an existing organization or unemployed at the time of their discovery, are the entities that discover opportunities. The organizations that employ people are inanimate and cannot engage in *discovery*." (Acs et al., 2006, p3)

The data analysed below certainly resonate with this claim as it is clear that it is key individuals within organisations that have become attuned to and then taken the opportunities presented to combine and align national and local energy efficiency governance arrangements.

5.2.3 To Combine and Align

The major role of NGEs is to align national policies with local socio-techno-economic contexts, and to combine policies effectively. Energy efficiency policy implementation is facilitated by complex sets of relations which have been formed at points where commercial opportunity and policy fuelled resource flows meet; these are the niches referred to above. Previous accounts of governance niches have been few and accounts of governance and policy have tended to under-analyse exactly what constitutes entrepreneurial behaviour or what structural characteristics facilitate entrepreneurial activity (Sheingate, 2003). In his analysis of contemporary policy networks Sheingate argues that greater attention ought to be paid to how political and institutional complexity shape prospects for change; *"The uncertainty of outcomes (in policy or politics, for example), the multiple and heterogeneous components of complex systems,*

and the sometimes ambiguous relationships among actors and institutions provide the opportunities, resources, and assets for speculative acts of creativity" (Sheingate, 2003, p186). Sheingate also stresses that entrepreneurial activity in governance settings is activity between rather than within institutions and it is this connective potential that is most important about the hybrid niche entrepreneurial agencies analysed here. Indeed their connective potential is two fold; to combine and to align. Firstly they combine national policy diagrams and secondly they align national projects with local needs by aligning competing demands to assemble energy efficiency arrangements.

Firstly then, NGEs are defined by their ability to combine governmental projects originating in diagrams of at least reduced fuel poverty and reduced carbon dioxide emissions from UK homes, as extracts such as this one suggest:

"There is a huge amount of chat going on amongst I would call the chattering classes about 'these programmes need to work better together', 'there needs to be better coordination.' I actually think that is lazy thinking on their part because it is a sexy thing to say, it's a fashionable thing to say, but when you dig down usually they don't know what the hell they're talking about. Essentially what we've got are three funding sources." (Government Contractor, JC)

This capacity to weave together the otherwise disconnected limbs of national policy by recognising and acting upon the economic opportunities in doing so characterises them

as entrepreneurial as well as governmental. The particular ways in which they achieve these combinations is discussed below through the analysis of the area studies.

The second feature of these organisations which defines them as niche governance entrepreneurs is their alignment work. They bring together separate resource flows by working between local, national and international institutions to bring into being new forms of energy efficiency service provision. That is, they align national projects with local demands by matching the economic flows of national policy to the socio-technical contexts of the communities they serve. This work is seen as alignment as it involves manipulating the otherwise independent trajectories of climate change and fuel poverty projects so that they not only fit one another but fit localities to create new socio-techno-economic arrangements. Whereas Rose and others refer to this process as one of translation, a "unidirectional conversion of something that is fixed" (Murray Li, 2007, p288), Murray Li insists that 'alignment' is a better way to conceptualise the process of "forging alignments" (Murray Li, 2007, p288) as it encourages an appreciation of how governmental projects can be modified, manipulated or compromised in response to the divergent agendas of user groups, infrastructural influences and so forth. This quotation illustrates how the NGEs studied here can be usefully thought of as being involved in forging alignments rather than unproblematic translation:

"(The project's) approach is flexible and so can be tailored to meet the needs of local communities. The aim is to facilitate the coordination of existing initiatives and to build on existing strengths. That's why it works." (Enterprise, HS)

"We've been here for a few years now, just looking for ways to provide a service to local authorities in the region, or other agencies, and what we do is a bit of this and a bit of that. We work for x and y, we do their EEC work for them, but we can make it work by convincing them to invest their Decent Homes money into the projects. We're also going to be building on that by handling x's z project, which will mean we've got two hats on but they're pretty closely related – we do that bit." (Enterprise, PM)

In an earlier discussion of the nature of public entrepreneurship Roberts and King (1991) argued that non-state actors from outside formal positions of government translate and implement new ideas into public practice, while Kingdon in 1984, in his four part schema of the functions of policy entrepreneurs, suggested that such actors have a critical implementation function. These early studies were conducted in a more structural theoretical context than that taken here but they are important however in establishing that non-state, and non-traditional governance actors can be of great importance to policy implementation and in bringing policies together in creative ways as has been developed by a small number of writers adopting a socio-technical approach to the energy transitions (see Lovell, 2007; Smith 2003) as discussed above.

What should be stressed here though is the extent to which the NGEs observed in this study are in many ways commercial as well as governmental entities and the advantages they seek to enjoy from acting in niche environments can be both policy outcomes, as theorised by Kingdon (1984) and Roberts and King (1991), *as well as* commercial advantages:

"We've got different pots of money for different areas. There are NRAs (neighbourhood renewal areas), New Deal for Communities (NDC) that kind of thing, the RDF, the European Regional Development Fund. I couldn't be a finance manager if I tried but I'd hate to be a finance manager in this job since there are that many pots of money that all have to be spent. ... We've done 104 heating systems, some of which have been through these funding streams, others we've had to pull it in from other organisations but we've done all the leg work to make sure they get them for free." (Warm Zone, JM)

"What we try to do is look after the people that we treat, get them talking about us, like how much of a difference they've noticed with the walls done, and how it wasn't as messy as they thought. If we can get them talking about us, at least in a good way, then it means they're happy, they're saving money and we're going to get more business off their neighbours you know." (RSL, KP)

Material like this suggests that governance entrepreneurs in energy efficiency can seek both these social / environmental outcomes as well as the development of their business interests. By being able to synthesise governmental projects to create patterns of interaction and coordination which are attuned to the local cultural, material, technical and economic conditions, niche entrepreneurs have been central to the coordination of fuel poverty and domestic carbon dioxide emissions reduction in the UK. In particular, in the case of organisations such as Warm Zones and EAGA, a small number of entrepreneurial individuals have been instrumental in performing this

combination and alignment work. Their 'models' for this work have then been disseminated and used by others, in the case of Warm Zones, or has been written into contracts with national government to protect their position as leaders in the field – making EAGA a key operation partner to the government (as is developed in Chapter Six).

The above discussion has presented NGEs as organisations which transgress several artificial categorical boundaries often used by social scientists. In particular, they blur such lines in three ways: they disregard ontological, scalar and sectoral boundaries. These features only look like transgressions if we assume the NGEs to be singular organisations operating as units of agency in a policy process. However, the data presented above which shows them to be defined by connectivity and alignments suggests that a better way to conceive of NGEs would be to think of them as hybrid entities. From such a perspective their activities can be seen as relational rather transgressive.

It is not enough to simply say that the niche agencies involved in coordinating national policies transgress boundaries; greater analytical clarity is demanded by their complexity. It is suggested that there are at least three dimensions to these processes of alignment and combination; they permeate ontological, scalar and sectoral boundaries. Their relational constitution means that NGEs cut across these divisions, and through an acknowledgement of this we can observe the ways in which they are (un)able to assemble socio-techno-economic arrangements which synthesize several governmental

projects simultaneously and interface with other actors and actants which might be near or far, large or small, powerful or marginalised.

5.2.4 Ontological Hybridity

The agencies coordinating the national energy efficiency programmes in local settings can be thought of as ontologically hybrid because they are made up of a range of different types of 'things' - constituent parts which include human, social, technical and economic elements. The components tend to be; humans in the form of staff, directors and 'clients' of varying descriptions; material 'things' like energy technologies, insulation materials and the properties of existing heating systems; information and skill based technologies such as accounting systems which allow for the integration of EEC, Warm Front and Decent Homes funding, the skills which are learnt for installation and repair of physical technologies; social components such as discourses of climate change, fuel thriftiness, corporate culture, values such as safeguarding the environment or vulnerable social groups and the performance of markets by adopting subject positions of consumers, retailers, suppliers by the variously enrolled human actors; and economic elements, most importantly the funding made available by the national government, although in the case of EEC / CERT not paid by them, for the various energy efficiency programmes. These various components achieve agency as a result of their ability to enlist one another's capacities in creating the policy outcomes that are made possible by the flows of money around the major energy efficiency programmes.

This socio-techno-economic interaction can generate problems as well as solutions. In many ways the pre-existing, durable material patterns with which they have to work slow down and restrict their progress in synthesising the policies with other programmes. The following quote is from a local NGE representative, one of the most high profile organisations studied, who is describing her problems in trying to integrate the work of the project with other local government schemes to modernise the housing stock in the locality.

"Not windows. We don't do windows. Boilers yes. We could get hot water tanks and things like that. You see they're going through a massive modernisation programme, the houses, to meet the Decent Homes Standard. It's got to be done by 2010. ... They're doing roofs so we can't insulate until the roof is done. It's a nightmare, a logistical nightmare. 32,000 houses all at a different level of their investment programme. It is a nightmare." (Warm Zone, JM)

While she is clear about the technologies that the NGE is able to work with, she emphasises the complications caused by the concurrent works – describing a messy job of matching up the upgrade work being carried out by the council and their own energy efficiency work. Here, although there is the technical capacity to install the energy efficiency upgrades, the work is made more costly and slowed down by the logistically complex materialities of the spaces in which the project operates. The nature of NGEs is then at once human, social, economic and technical.

5.2.5 Cross-Sectoral Relations

As well as considering niche agencies to be made up of a range of types of components, it is also important to notice that they are sites of confluence for state, private, and voluntary sector phenomena. The idea that there is a spectrum with state at one end and the private sector at the other and that somewhere in between are social enterprises is a problematically linear one (Bulkeley and Moser, 2007. P2). A modification might be a chart with three indices of 'stateness', 'privateness' and 'voluntariness' which would conjure a three dimensional space in which one might plot the coordinates of an NGE. This too would be a troubled project as it would lead one to consider an organisation to be reducible to singular identity, traceable to coordinates in this three dimensional analytical space. The argument presented here is that NGEs should not be positioned by such fixed coordinates, instead they can be simultaneously enrolled with state actors, private actors and voluntary actors, and can be animated by flows from all these and other hybrid agencies in order to do their work. As a result they are made up of various capacities, as exemplified by the following quotation:

"OK. We are (name), and it is a private company, but a not-for-profit company, limited by guarantee. So, we're funded by various different organisations, and a lot of our money comes from the EST, some of our funding comes from the local authorities we work for, 'cause we are the advice centre for (three local authorities) and we do lots of work with another. ... We've got two kinds of things; we've got the EEAC which is obviously advice to people and also referring onto registered contractors and installers to actually install the measures, so we would get a fee for referring our customers on to

our contractors so that's how we work that side of the business, er, and that runs throughout the three local authorities; and then the other side of it we run the (project) and that's funded by the council and other partners." (Enterprise, HS)

Which is it? Private? Public? Social enterprise? This sectoral connectivity of NGEs encourages them to be viewed as entities which exhibit private-public-voluntary characteristics. The core or centre of these entities is difficult to pin point but they can be understood as a series of associations between differently enrolled actors and actants. In effect, a network has been built which will enable energy efficiency work to proceed in the locality and without the activity of the governance entrepreneur the area, in this case a district in the north west of England, would be poorly served by the 'state' alone, as Mander's study of renewable energy projects in the north west also concluded (Mander, 2007).

5.2.6 Inter-Scalar Connections

The outcomes that these niche agencies seek to bring about are local in scale - they are confined to local authority level - but they are the product of multi-scale networks which are facilitated by local, regional, national and international relationships. The extracts above highlight another aspect of this inter-scalar connectivity however, they draw attention to the work that must be done to move across and between scales. This kind of work, running between scales and combining resources in sub-national implementation networks requires labour in order to combine the projects, secure funding as well as financial competence to go out and do the work then write it up in

such a way that the paper work formalises the scalar connections. It is a process of multi-scale diagram integration which involves looking for opportunities to align demands from different scales into one another to benefit a local area. Several interviewees made comments similar to the one below, and even described financial creativity and flexibility as crucial elements of their work. The capacity to understand funding regulations and work within and around them is central to this kind of combining and alignment work where separate pots of money lie unrelated and un-enrolled in between policies from different scales. It is seen as a role of the NGE to find and harness these financial resources which enable them to do the work they want to do in the communities they want to serve and often let financial reporting connect the resources retrospectively. From this perspective the energy efficiency outcomes are seen as socio-technical expressions of the potential created by the co-presence of funding streams. Crucially however they would not occur if the streams were not fed into one another by NGEs.

Recognition of the multi-scale nature of climate governance is increasingly wide spread in environmental literature (see Bulkeley 2007, Dilling 2007) and several accounts of multi-scale or cross-scale governance have informed contemporary understandings of local responses to carbon reduction. Importantly then, as well as responding to local contexts and becoming attuned to the specifics of the areas which the organisations serve, energy efficiency outcomes are made possible by the ability of key entrepreneurial figures to do extra multi-scalar work in order to connect the national and the international to the local. By bringing phenomena from different scales into coordinated interaction through the mixing of socio-techno-economic

streams of resources, capacities, discourses and technologies, niche entrepreneurs can bring about energy efficiency outcomes in target communities that are typically more sophisticated, better resourced and targeted than would be possible for an exclusively local, national or international actor to achieve.

The result of this multi-faceted hybridity and connectivity is that NGEs are able to combine and align projects, policies and people. Energy efficiency services are provided in communities because of the nimble, flexible and responsive agencies operating in sub-national governance niches in the UK. By bringing together sectors, scales, humans, things, resources and capacities NGEs are able to do what central government does not; they take responsibility for energy efficiency governance in localities and they combine national programmes in new, often very effective and creative ways. The outcomes of such processes across the UK are varied, as one would expect, and the geographic differences in energy efficiency outcome highlight how different spaces are connected to or made distant from optimum states of interaction envisaged as being universally applicable by the national government. The differences in energy efficiency governance arrangements in different places will be developed in the following discussion of the area based studies.

5.3 Geographic Difference and Inequalities

The success of NGEs in combining and aligning governmental projects has lead to a recognition in central government and among energy NGOs that locally managed projects focussed on creating outcomes for geographically defined areas but which

draw in funding, resources and expertise from a variety of scales and sources are among the most effective means of coordinating fuel poverty and domestic carbon dioxide emissions reduction policies (Baker et al., 2005). By accepting a restricted network management role central government is unable to guarantee the adequate realisation of its diagrams across its territory, and instead the responsibility for creating outcomes for communities is passed to NGE agencies who are unlikely to have any interest in securing equality of provision between regions and localities other than in the communities they themselves serve, as this quotation suggests:

"There are networks set up, like the HECA network, where you can meet and talk to other people in the same sort of line of work but really we have just got to try to do the best we can for our patch. I mean, if somewhere in Yorkshire gets a good deal from (an energy supplier's) EEC team I think, bloody hell, we should have got that. There is a bit of competition between us because we all know they've only got a certain amount of money at any one time and you never quite know how much, so if someone else is getting it, like (x), it means we're not." (Enterprise, SB)

The spatial outcome of this is that hybrid niche agencies perform in different ways and with varying degrees of efficacy in different places and at different times, meaning that energy efficiency governance is mature and well established in certain areas of the UK but underdeveloped in others. The three area based studies highlight this geographic diversity. Analysis suggests that at the time of the fieldwork, in 2007, there were two observable phases of energy efficiency project delivery, and a third which was as yet undefined but felt to be immanently emergent. The following section presents an

analysis of the three area studies through which the different phases of energy efficiency governance and the vulnerability to governance gaps will be drawn out.

5.3.1 Phase One

5.3.2 Early Stewardship Through Public-Private Interaction in Kirklees

Kirklees Metropolitan Borough in West Yorkshire has been recognised as a pioneering local authority on low carbon energy programmes, having lead projects such as the SunCities renewable project which involved installing 5% of the UK's total solar capacity in the borough and creating iconic installations such as the Civic Centre 111 Project. The attention given to climate change policies contrasts however with the observation that in comparison to some other areas Kirklees Council has been relatively slow in coming up with a comprehensive response to fuel poverty. The appointment of a dedicated Affordable Warmth Officer in 2005 however meant that the Council could begin to address the issue. Between 2005 and 2007 Kirklees was in the process of setting up an Affordable Warmth Steering Group which was geared up to launch a Warm Zone and create an Affordable Warmth Strategy, both of which were achieved in 2007.

The process was managed by creating strategic partnerships with key stakeholders in the area such as the Primary Care Trust, the Citizens Advice Bureau, and the Registered Social Landlords, as well as gaining expertise and advice from the regional NEA operations manager. Two important NGEs have been crucial to the progress made by Kirklees Environment Unit in bringing about a coordinated approach to

energy efficiency however; Warm Zones Ltd and Kirklees Energy Services Ltd. (KES).

Table 5.1: Domestic Energy Governance in Kirklees

Key Organisations	Borough Council Environment Unit, NEA, Kirklees Energy Services as operators of the Warm Zone and the EST EEAC, Affordable Warmth steering Group, EAGA, Primary Care Trust, Primary Care Trust, Citizens Advice Bureau
Key Documents	Kirklees Environment Vision 2025, January 2007. Affordable Warmth Strategy, September 2007 - 2011

In Kirklees the creation of a Warm Zone and an Affordable Warmth steering group was observed, providing an opportunity to witness the stewardship and guidance provided when a local authority engages with the Warm Zones model and puts its resources into a network in which experienced 'midwives' are given licence to steer outcomes and act as advocates. The result is that the local authority surrenders some of its freedom to tailor its energy projects and places its trust in the Warm Zones model, and the stewardship of NEA. The result is that best practice from other areas is used to apply a franchise-like approach which is however attuned to the areas particularities as this quotation illustrates:

"We are going to start this Warm Zone process. It's a clean slate. We've got external facilitators in NEA. I'm looking for representation on a steering group. ...We also have KES, who manage projects for Calderdale, Wakefield, Bradford and to some extent Leeds, ... That's a good learning forum in terms of learning how other local authorities are working in this area. Obviously the NEA has regional forums; there are the HECA forums, which again are broader – the Yorkshire and Humberside one – in terms of exchange of practices across the area." (Local Authority, SE)

In this case the complexity of the several different central and local government policies that preceded the Warm Zone was overwhelming, referred to by one practitioner as a 'policy blizzard' and made worse by the fact that the new officer had no significant prior experience of energy efficiency governance, because the Affordable Warmth work was located within the environment unit rather than a dedicated energy unit. In Kirklees NEA operational staff and Warm Zones are able to act as policy aligners and combiners for local practitioners, enabling them to make sense of the various otherwise disorganised energy related policies and link them to practical courses of action for the local actors. In this first phase of energy efficiency governance the work being done was to create a Warm Zone. The simplification of branding, programmes and modes of engaging with the community are also cited as key advantages of adopting the Warm Zone approach; it combines the energy efficiency programmes synergistically and brings clarity to an otherwise confusing field of energy efficiency initiatives. More specifically it provides an intensive area based sweep of a local authority catchment and attracts resources available from energy suppliers' under their CERT schemes, local authorities under their Decent

Homes Standards schemes and from the national government through their Warm Front scheme. The resulting installations are co-financed but in such a way that each contributing organisation gets 100% of its discreet target 'hit' but only pays in part (explained in more detail in Chapter Six). The result is an organisation which is effective because of, and indeed is defined by, its ability to move combined resources and align projects from various scales, to fuse policy projects to technical installations and to connect governmental to commercial objectives. Crucial to the success of the approach is the ability to translate multiplicity into simplicity:

"GP: What are the big advantages of the Warm Zone?

Participant: With the work that (my colleagues) have done over the last few years there has been a gradual build up of a lot of different schemes but that is a quite confusing picture to anybody out there in Kirklees, or anywhere. I mean we get confused in here – well we are about the only two people who know now, and I certainly took some time to understand it all – about the number of schemes with the term 'warm' in. It's a very confusing picture when you are trying to promote these grant schemes and levels of support. So the branding issue in terms of having this local authority backing the scheme under one name, all the criteria will exist within there but Mr and Mrs Jones will not see that." (Local Authority, EF)

Interestingly however, although the local authority decided to set up a Warm Zone, its operation was outsourced to a third party contractor who manages and implements both the fuel poverty work of the Warm Zone and the carbon reduction work of the local EST EEAC. They act as an outsourcing company with an expertise in energy

services but also bring together the fuel poverty and climate change elements of governmental energy projects in efficient and coordinated ways. They have been able to position themselves expertly to capitalise on the increased demand for energy services to be provided in the West Yorkshire area and are an NGE that are instrumental in bringing together sub-national energy efficiency governance. They provide the staff and the operational capacity to carry out the fuel poverty focussed Warm Zone work while also being able to provide the carbon abatement and energy advice services required by the EST. Furthermore they are a key node in West Yorkshire because they effectively house and perform much of the energy efficiency work in their offices, so that the local government not only *learns from* them but is also *performed by* them:

"NGE Representative: We've got two kinds of things; we've got the EEAC, which is obviously advice to people, and also referring onto registered contractors and installers to actually install the measures, so we would get a fee for referring our customers on to our contractors. So that's how we work that side of the business, er, and that runs throughout the three local authorities; and then the other side of it we run the Warm Zone project for Kirklees, and in Kirklees that's funded by the council and other partners." (Enterprise, HS)

The outcomes for the community are that energy efficiency help and support is available in Kirklees through well developed networks of trusted partners. Also, the entrepreneurial activity is undertaken at an organisational level and based on best practice rather than individual reward. While affordable warmth work is at an early

stage of development, it is recognisably in the first phase of a mode of combining fuel poverty and climate change initiatives that were observed to be occurring in other areas too. This area based approach involves the adoption of best practice as communicated by facilitators such as NEA or the HECA network and the integration of funding streams as described above. They key characteristics of this first phase are summarised in *Figure* 5.2.

Table 5.2 The First Phase of Local Energy Efficiency Governance.

The local authority engages with the Warm Zones model or other best practice model on advice of facilitators.
The entrepreneurial activities are well established and are conducted by organisations rather than led by individuals.
An Affordable Warmth Steering Group is created, or similar. Members will include key local government partners, NGEs, charities as well as energy suppliers EEC / CERT representatives.
Resources fed into a multi-scalar, multi-sectoral network in which experienced 'midwives' are given licence to steer outcomes and act as advocates.
The result is that the local authority surrenders some of its capacity to be independent and places its trust in the best practice model.
The NGEs involved extract funds from the local authority, national energy suppliers, national government in order to make implementing the various programmes profitable.

The simplification of branding, programmes and modes of engaging with the community are cited as key advantages of adopting the Warm Zone approach - negotiating the 'policy blizzard.'
This phase will last from the creation of the steering group until around 2-3 years into the operation of the project, at which point it is likely that the network will move into a second phase.

5.3.3 Phase Two

5.3.4 Maturity and Saturation in Newcastle Upon Tyne

"GP: It's funny, I was at an Art event on the quayside recently, and there was the EST over here with the climate dome, and there was the Warm Zone on the other side of the square giving out leaflets and sponsoring a rowing event and it occurred to me; they're competing for the same audience.

Participant: Yeah. We are." (Warm Zone, JM)

The presence of three large and energy aware organisations in Newcastle Upon Tyne, EAGA, NEA and Warm Zones head quarters, has lead to the emergence of a pool of highly skilled local energy professionals and has resulted in the development of several energy efficiency, low carbon and affordable warmth networks. By developing expertise through engagement with these actors and by the City Council locating

energy efficiency work within its own dedicated energy centre the area became a pioneer of local energy efficiency governance through partnership and intensive network development. For example, the north east had the first NEA regional coordinator, Newcastle was one of the first Warm Zone areas, the Newcastle Warm Zone is used as a case study for the development of new zones, the City Council set up its dedicated Energy Centre in the 1980s and in 2006 published an ambitious energy strategy which sets targets for energy savings from domestic properties.

Table 5.3: Domestic Energy Governance in Newcastle

Key Organisations	City Council Energy Department, NEA, Warm Zone, EST EEAC, Your Homes Newcastle, Sustaine, Carbon Neutral Newcastle, Affordable Warmth Steering Group, EAGA, Primary Care Trust, North East Domestic Energy Forum
Key Documents	Carbon Management Programme Strategic Implementation Plan, Affordable Warmth Strategy 2002, update 2005 North East Fuel Poverty Declaration

5.3.5 Uncertainty

At the time of the fieldwork the Newcastle Warm Zone was moving into its final year of operation and the maturity of the City's responses to energy efficiency problems,

while very impressive in the number of installations achieved[5], had begun to saturate the city with a limited range of measures offered by several overlapping organisations including EAGA Plc, the EST Energy Efficiency Advice Centre, and local installers. The Warm Zone was in what might be thought of as the twilight of its operation, characterised by decision making and planning being impeded by uncertainty about what might replace it and staff being concerned about their contracts;

"We don't know what's around the corner to be honest. I mean our contract only until runs until April so we can't plan too far ahead, even for our jobs you know. I mean the EST is here to stay so it makes sense to stay pretty close to them – you never know..." (Warm Zone, JM)

5.3.6 Competition

In addition to the guiding objectives of the project being muddied by concerns about dwindling funds there were also considerable concerns about how to compete with other, better resourced energy efficiency programmes which might not only outperform the Warm Zone in terms of public appeal but which would be likely to outlast it. Life after the Warm Zone and the effects of saturating communities with mixed energy efficiency messages from competing brands were a cause for concern for a Warm Zone representative in an interview:

[5] Between 2004 and 2008 the Newcastle Warm Zone treated over 27000 homes with insulation, saved 25000 tonnes of carbon dioxide, created £3m per year in energy cost savings and generated over £5 in previously unclaimed benefits for households in the City (Newcastle City Council, 2009).

"Warm Zone, JM: (EST) have a multi-million pound marketing budget, and even in Newcastle they're doing a lot of work ... In the last three years we've deliberately not stepped on each other's toes, but I've made the decision this year, being the last year of the project. ...I met with them on Thursday and said 'Look, I really think we need to be working more closely', and for the very reason that, I'm not daft, they've got a huge marketing budget, EST even have sponsorship bits on UKTV Gold, people identify with EST, so what I've suggested to them is have more events in Newcastle and we'll do them with them and it's got to happen in this final year of the project, because it makes sense for our brand."

It would appear that Newcastle is experiencing a second phase of energy efficiency governance in that the phase that was observed in Huddersfield has passed in Newcastle and while it was successful in its own terms, as detailed above, problems remain. Characteristics of the second phase include overlap between the competing of policy interaction established in Phase One and other factors such as the work of the EST, concern over the job security of those employed by the agency, a realisation that despite the success of the area based approach many houses remain untreated, energy price inflation has undone much of the fuel poverty alleviation work, and an admission that even experienced policy 'midwives' have little experience of what might come next, as detailed in Table 5.4.

Table 5.4 Phase Two of Local Energy Efficiency Governance

• Contracts set up through facilitators approach expiry.

• There is competition for ‘clients’ between WZ and EST or other agencies.
• There is a realisation that although the WZ has delivered large numbers of installations there are persistent problems not yet resolved in the local energy efficiency work.
• Price inflation has undone much of the hard work on Fuel Poverty.
• There is uncertainty about what will follow the existing contracts and how the policy landscape will change post 2011.
• Even experienced stewards have little experience on which to base recommendations of how to move forward.

The persistent problems that remain unresolved as the Phase One assemblage of partnerships, contracts and installations reach maturity are several. Firstly many households are reluctant to become involved in a government scheme, even one designed to raise income or reduce costs, as discussed in the Chapter Two’s discussion of disengagement from government. Secondly some problems stem from the powerful durability of the housing stock, its unchanging, brute indifference to the discursive shift to energy efficiency in government, and the ways in which the technical characteristics of the locality’s dwellings and energy infrastructure determine what is and is not possible, or more tellingly, what is or is not economically viable given the structuring effects of the policies’ logics.

Developing this, the economic structuring of the policies pre-structures the possible ways in which the fuel poverty and climate change programmes can be integrated; despite the flexibility of local NGEs their conditions of possibility are set by central government institutions. The mechanisms generating these socio-techno-economic obstacles which continue to face Newcastle and other areas coming out of the first phase of energy efficiency coordination are dealt with in detail in Chapter Six's analysis of the effects of the logic built into national policy programmes, but what must be focussed upon here is the geographic difference in outcomes experienced. To be explicit, Kirklees is three years late in enjoying the benefits already completed in Newcastle and as the £5m in additional income and £3m in cost savings enjoyed in Newcastle as a result of the Warm Zone are annual figures, Kirklees is over £24 million worse off as a result of being slow to align and combine the energy efficiency projects of the national government. That work is now underway however as a result of collaboration between NGEs, the local authority and facilitators. In the third area studied a different scenario was unfolding in which a governance vacuum was filled by NGE activity.

5.3.7 A Policy Gap But Not a Governance Gap: The Precipitation of Entrepreneurial Action in the Eden District

In the Eden District the local authority does not have a member of staff dedicated to energy efficiency or sustainability, while the county has a two person sustainability team. Energy efficiency is described as a '*policy gap'* by the county as their

sustainability work is organised around the wider principles of sustainable development and focuses on sustainable tourism and land use. The most high profile energy issues in the area are wind power, as the county has a large wind resource and several long running disputes over use of land for wind farming, and the development of nuclear power in the County as the nuclear energy industry is a major employer. These issues tend to dominate local energy debates and take up much of the time and resources of the county's sustainability team.

Table 5.5: *Domestic Energy Governance in the Eden District*

Key Organisations	County Council Sustainability Team, NEA, CEEAC, Eden Local Authority21 / Cumbria Action for Sustainability, EAGA
Key Documents	Sustainable Cumbria: A Strategy for Growth and Progress, 2004-2024 Green Guide to Cumbria, January 2008, Eden Local Authority21
Energy Efficiency Model	Niche non-state energy efficiency action in a state vacuum
Local Authority Stance on Energy	Unresponsive, under resourced.

The following quotations illustrate the paucity of energy efficiency resourcing in the county and district councils, and demonstrate that in order to achieve anything at all the local authority sustainability team has had to devolve responsibility for energy efficiency outcomes to NGEs who can respond to and align the opportunities presented by the co-presence of the central government and energy supplier resource flows and particular needs of the communities in the Eden District. It suggests that the local authority has passed on not only the responsibility for implementation but also for coordination, despite the optimistic comment from the sustainability officer, to others and retains only the role of governance auditor. This differs to the data from Newcastle and Kirklees where implementation was achieved by partnerships of local government departments, NGEs, energy suppliers and others.

"(The governance gap) puts a strain on the LA21 charities, to drive the sustainability agenda and it's probably an indication of where sustainability sits as a priority for public bodies, because in Cumbria sustainability is two people and if we get a couple of appraisals to do it takes up half our year. What we try to do is link in with as many different people as we can, so in the case of energy efficiency, the EEAC can deliver that side of things – so we are increasingly being coordinators and policy checkers rather than on the ground changers." (Local Authority, PD)

"GP: How is fuel poverty governed in the County?

Participant: On the policy side you've got the sustainable energy strategy for the NW, and one of its elements is to tackle fuel poverty. You've then got the structure plan, which is more about large scale renewable energy rather than domestic scale energy

efficiency so I think there's a policy gap there. The supplementary planning document is largely about wind energy and farms as opposed to domestic scale, so I think there's a policy gap in terms of setting the framework for domestic renewables and tackling fuel poverty. Where it's probably best picked up is in the community strategies, which are influencing the development frameworks. They're not all doing it at the moment, there are five LSPs and some are better embracing aspects beyond the economy than others, but I see that as a way for us to influence the planners really, through that – supposedly now called 'sustainable community strategies,' I think we need to energy-proof those documents and ensure that they're providing for fuel poverty." (Local Authority, PD)

Not only is there a policy gap but the local authority sees its responsibility as being to create policy and planning documents rather than in implementing or directly managing programmes of energy service delivery as is the case in Newcastle and, to a lesser extent, Kirklees. In interviews with council representatives it became apparent that the focus was on creating the correct local planning and policy framework, a task that the sustainability team were too under resourced to achieve, rather than coordinating or delivering services. In these circumstances it seems that in some ways the Eden local authority act in a similar way to the national government, i.e. centrifugally. Most notably they pass responsibility on to other agencies and retain only a regulatory capacity. There are differences however, of which most important is that they do not retain the same degree of managerial control over the agencies delivering the governance services. Instead it makes more sense to think of this as a governance gap, or vacuum, which an NGE has filled.

In the absence of a domestic energy officer at either the council or the district level a particularly entrepreneurial organisation founded and still largely driven by a single dynamic individual has become the de facto energy efficiency governance provider and coordinator for the county as well as the district, to which these interviews testify:

"Participant: We do their Decent Homes work and we've attracted money from (energy retailer) to pair it up with that. I mean if I didn't push them they still wouldn't have done a thing.

"GP: Do they approach you to do the work, or is there a tendering process for that?

Participant: No we've just made it happen. Dragged them by the scruff of the neck really!" (Enterprise, SB)

"GP: Who looks after the energy efficiency work in the district?

(No reply)

GP: Who manages the things like insulation upgrades?

That'd be (NGE Manager's) territory. She's in Carlisle. They manage all that side of (sustainability)." (Interview with Local Authority Representative) (District Authority, SW)

The managing NGE in the area works with other NGEs and voluntary sector agencies such as the local LA21 charity, NEA, and local community organisations to deliver

energy services to the local communities, so the 'policy gap' left by the council does not in this case result in a 'governance gap', and rather the governance gap is recognised to be a niche which the NGE is able to exploit by aligning the opportunities written into the national policy projects with the demands of the communities:

"We provide help to a range of householders... by keeping track of new funding schemes. In a single phone call we can usually assess an applicant's needs and match them with the best deal. ... A home survey is then carried out to make sure the installation they want is the right one for the property." (Energy Efficiency Enterprise, Corporate Statement).

The outcomes of this NGE dependent governance arrangement are that a near vacuum was created by the incapacity of the local state to provide energy efficiency services and as a result a niche opportunity emerged due to the presence of the major funding programmes, the challenging technical conditions faced in the rural north west (Poor coverage of the gas network combined with a high number of old and non-standard house types) and this 'policy gap'. This opportunity was taken by the managing NGE and the result has been the effective and economically efficient provision of insulation, heating technologies and advice to the limits of what the national policy projects make possible.

While implementation and coordination has been successful in the Eden District, it too is now in a phase of maturity and increasing uncertainty over what will come next.

Between 2007 and 2011 there will be CERT funding available but the management team at CEEAC were already looking for new funding streams to which they could apply in order to survive as an organisation. This is evidenced by them taking on responsibility to run the Cumbria Energy Efficiency Advice Centre as a means of acquiring a second major funding stream, thus reducing dependency on the EEC programmes. They saw the EEC funding as being lucrative but reported that the huge peaks and troughs in the amount of funding available, and the uncertainty about how it would change in the coming years, made them cautious about relying too heavily on EEC, while they also felt that the local authority would be unlikely to make significant further contributions under the Decent Homes Standard, thus making them question the future viability of their 'Phase One' business plan:

"There could be a rush, there could be a little splurge this time next year if we have got any EEC to money that hasn't been spent. Nobody really knows, that's the problem. All the utilities are the same; they all say 'we spent all our money so we're not doing any more'. What sometimes happens is if it had a really good start and if they're confident they can get the last six months done quite quickly then it's in their interest. They have to get their savings but it doesn't matter if it costs them 60 million of 40 million, the saving is the same. If they can sting their customer for a few months and then in the last six months knock off their prices down if they have to, to get the last few through, then that is what it will do. So what we don't really know is if whether there is a significant wodge still left... The utilities are keeping it very close to their chest. (Government Contractor, JC)

"It's a problem for our industry. Talking to all the utilities at the start of the EEC 2, we were told there is going to be x million pounds of work so you go through getting staff trained and you get all the machines on the road and in January they pulled the plug on it. 27 people would have been laid off next-door had we not had a stash. Money is so hard to come by that you never waste it. Is so it only ever goes on what is absolutely essential at the time, and that stash kept us going until the next financial year, when the last of the Decent Homes money from Carlisle kicked in." (Government Contractor, JC)

5.4 Amplification of Spatial and Temporal Differentiation

The independent review of flexible area based approaches to domestic energy efficiency policy implementation such as those discussed above reflected the success of organisations such as the Warm Zones Ltd and the NGE in the Eden District study (Baker et. Al., 2005). It concluded that 'local strategies for tackling fuel poverty should form an essential element within the Government's Fuel Poverty Strategy' (CSE, 2005; iv), a conclusion that has been fed into central government policy circles and has contributed to the creation of a new funding stream which goes even further to precipitate such niche activity as that described above. The Community Energy Efficiency Fund (CEEF) is a scheme launched in 2007 in response to ongoing consultation, that aims to improve the delivery of Warm Front and the EEC through area based initiatives managed by NGEs. Central government departments have been made aware of this process of sub-national energy efficiency niche activity and,

recognising its effectiveness, attempted to encourage other areas without such active networks to move toward a locally integrated energy efficiency governance arrangement:

"Ministers are very keen to involve the markets towards a more holistic approach because customers seem to want that, understandably, they don't want to have to be knocking a lot of different doors to get help and so where it is appropriate that can be interaction and where we can encourage interaction between schemes we certainly do, and this is why we are about to start launching this new work. We're doing an area based initiative such as Warm Zones where we do more work to help coordinate activities in particular regions or areas. This goes back to what we were saying earlier about what government intervention should be, where the market can work by itself we'll leave it to do so, where we can prompt it or push it we'll do that, but there are some places as in dealing with fuel poverty where our experience to date is that we pretty much have to drag that." (DTI, JH)

As well as endorsing a decidedly local mode of governing, the above quotation from an interview with a central government scheme manager also stresses that a push toward this kind of arrangement is needed in '*some places'*. Although the three areas studied in this project all had some form of local energy efficiency service provider at work there are many parts of the UK where this is not the case and alignment and combination of schemes does not happen. In these places, households are left to connect up and apply for funding themselves, or with very limited help from local authorities, as Caldecott and Sweetman conclude (Caldecot and Sweetman, 2009). One

example of an area that at the time of the study was without a coordinated response to energy efficiency is North Tyneside, Newcastle's neighbour, where there is no Warm Zone (at the time of writing, although one is now planned for 2008), no local authority energy efficiency team, no local grant scheme and no managing NGE. The disparity of service between the two local authorities was commented upon by several interviewees and is a prime example of geographic disparity of outcomes even within the same urban area.

This mode of governing through local hybrids leads to an ethical dilemma which Powell and Boyne (2007) call 'a problem of territorial injustice.' The problem is that there is considerable geographic inequality in energy efficiency governance provision between localities, a finding supported by Baker et al.'s study (2007). The problem of unequal outcome across different areas, highlighted by the CSE's 2007 scoping study, could potentially be exacerbated by the CEEF and new recognition of the capacity of local actors to govern in area based networks, as Powell and Boyne (2001) argue. The shift in the balance of power to the local from the central has been amplified by the CEEF programme and its outcomes as although designed to bring about more projects like Warm Zones it creates the risk of further widening the governance differential between well coordinated, highly networked local areas and those where networks are less well established. In order to avoid problematic outcomes in some areas facilitators such as NEA will be increasingly important in guiding local networks into particular, well established systems of coordinated implementation in the manner observed in the Kirklees study. However, this geographical inequality of outcomes calls into question the centrifugal mode of governing. As a result of prioritising flexibility and the use of

commercial intermediaries the national state institutions become distant from the outcomes and unable to define them with any precision - a point developed in Chapters Six and Seven.

The development of small niche organisations into well established service providers who have been able to consolidate their position in energy efficiency economies in a variety of ways is an interesting feature of this process as Warm Zones Ltd, EAGA and NEA all began as small organisations operating in niches in the energy efficiency governance landscape but have managed to survive and, EAGA more than the others, thrive on the emerging complexities of the new energy economies. The politics of these trajectories will be discussed in Chapter Seven, but it remains appropriate in this Chapter to note that Warm Zones, the sub-national energy efficiency model that currently appears to be gaining most momentum as government encourages others to tie the major programmes together on the ground rather than them do it at the top, is not right for everyone:

"Participant: Warm Zones are great, but the difference between us and (a certain) Warm Zone in the first year was that at the time we had 8 staff and they had 50, and we delivered more installed measures than they did. Now they have £10 million of European funding, and after they took the 12 months to get set up they are away now, they're doing it, but a lot of their work is social housing and ours is all private. The problem is that Warm Zones are great, but when you go down the formal Warm Zone route the bureaucracy increases significantly and because of that increase we have to employ extra staff to push paper around. ... What we felt was, for us, we wanted to

avoid a situation where we couldn't cope with what we were doing. We wanted to go back to a smaller scheme if we needed to.

GP: And you are not putting yourself on a hiding to nothing?

Participant: That is what we were worried about. A) it's very difficult to recruit good staff in this area, so we knew something was going to be an issue. B) We knew Sustainable Energy Centres were on the horizon, and that was more of a focus for us. Warm Zones, really, in the right place run by the right people are great. They also wanted something along the lines of a £1million or £2 million input from the local authority and that was not going to be possible." (Enterprise, SB)

This extended quotation draws attention to some of the problems with setting up a Warm Zone – ironically they are not flexible enough to suit every local setting. The differences between local governance settings mean that transferring best practices from one area to another as a result of central government evaluations of programmes is a process of policy learning and policy transfer (Evans and Davies, 1999), but it is not a simple process of copy-and-do. Bulkeley argues that such processes begin with a governmental intention to create particular energy futures but '*in practice, the abstractions of best practice become enmeshed in the particularities of the places from which they are derived and in political struggles … in the locales where best practice is deployed*.' (Bulkeley, 2006, 1029) This respondent, above, felt that her local authority would or could not provide the level of support required for a Warm Zone and that other issues of labour quality and scale would mean that a Warm Zone would prevent a Warm Zone from being as effective and efficient as an independently organised project, which was created with advice rather than guidance from NEA

consultants. The project designed and implemented instead of the Warm Zone was also more equally balanced between fuel poverty activity and carbon reduction activity and was able to brand itself and create a profile in the area based on 'energy efficiency' rather than fuel poverty, and therefore work with fuel rich and fuel poor households and more completely integrate renewables, insulation, heating systems and behavioural advice through a single network rather than rely on the less than perfect referrals systems operating in Newcastle between agencies. The result being that an alternative to the 'best practice' of a Warm Zones emerged which was similar but was able to evolve into an approach that better matched the needs of the local governance setting. So while it was not appropriate to transfer institutional 'best practice' into this area a similar practice emerged through consultation with expert advisory agents but more fundamentally as a result of the entrepreneurial approach and the nationally informed yet locally attuned problem solving activity of the NGE.

5.5 Precipitation of Flexible Sub-National Governance Arrangements

The important work being undertaken by NGEs in local responses to energy efficiency challenges is recognised by central government policy makers who cite their own inability to respond to local contexts as reasons for this apparent devolution of responsibilities, recognising that they cannot know a place as well as local actors.

"GP: What are the roles of local agencies in all this?

Participant: They are very important partners if you look at Warm Front scheme managers or Energy Efficiency Commitment suppliers are out there and doing, they're

people we need to be engaging with - for different reasons sometimes in terms of the scale of the things they are looking to do or else about the knowledge base about the local area, they can get into the right groups." (DTI, PM)

The data suggests that the stance adopted by government is that rather than being above energy networks looking down on it from a position above and with an unimpeded view of the space it governs, government accepts that it is itself actually placed inside the governed space. Government occurs from a place within social networks which makes some elements of the governed space, the country, visible while obscuring others. A consequence of this is that a government employs a relational mode of governing in which it employs other agencies to act as mediators between it and the non-governmental realm. This network of intermediaries are used as aligners through which the government connects to the world, by doing so, however, it removes much of its own capacity to interact directly. In such circumstances engagement and co-operation with households must be achieved through a network of partners who are able to connect government to the non-governmental through their spatial presence in the localities, their ability to perform the kind of inter-scalar work described above and their experiences of dealing with the specific problems and players in a locality. They are also skilled, or at least experienced in overcoming durable challenges presented by the condition of local housing stocks, utility infrastructures, supply chains and so forth. These kinds of obstacles are the kinds that throw up the complexities that central governments are poorly equipped to deal with when writing policy, to which the experience of the EEC detailed in Chapter Six testifies.

The result of this is that local energy efficiency governance spaces become what Murdoch (1997) might call 'spaces of negotiation' rather than of 'prescription'. The terminology refers to Callon's argument that while government can be thought of as a consensual process performed by heterogeneous collections of actors and actants working in "unison and though this unison traverse time and space to tie in localised others' (Murdoch, 1997, p363), empirical studies of the practices of government and the exercising of power relations reveal a more contested and complex series of negotiations, as do Allen and Cochrane's (2007) account of the imperfect "reach" of relational governance and Allen's and Murray Li's critiques of unproblematic translation of governmental projects (Allen, 2003; Murray Li, 1999, 2007)). The data presented above illuminate the extent to which local energy efficiency interventions rely on NGEs to perform government on behalf of the state which creates a potential outcome, and precipitates the emergence of an NGE to actualise its project by structuring incentives in particular ways. The resulting sub-national network is then engaged with central government but as it is simultaneously also in relation with local and international governments, businesses and voluntary organisations, the central government becomes one part of a network, rather than an external overseer and director. Consequently the space of local governance in energy efficiency matches the description of Murdoch's space of negotiation, in which emergent flows and re-connections can prevent the network from becoming '*heavy with norms'* (Callon, 1992, p91), leading to a plurality of governance arrangements in local settings.

On the ground, the outcome of the negotiability of local energy efficiency governance is such that problems get solved differently in different areas because social / political and technical factors create different sets of economic opportunities and paths of least resistance which are encountered by different sets of people. Patterns pull and push resources and capacities into locally specific states of interaction, making each local energy governance arrangement different.

5.5.1 Managing Multi-Level Alignments

The following quotation from a senior national policy maker sets out a vision of tiered hierarchical policy design and implementation, and there is both authenticity and fiction to be found in the vignette:

"GP: You mentioned the complexity of it all and the potential for these things to be joined up at the front end. Which actors, and which kinds of actors, are involved in doing that work?

DTI, JH: You've obviously got us at policy level, and that's different parts of DEFRA and DTI. So you've got government departments, you've got suppliers, you've got EAGA, our delivery agent for Warm Front. You go to the next level and you've got the intermediary bodies that EAGA will work with, so you've got the community and voluntary organisations, the EEACs, the trust (Energy Savings Trust) and their work and then you've got the individual. So you've got the whole spectrum and people are involved at different stages. So the overall principle that this is a good thing and it's important for these things to work together is set up at the top level. The how do you

do it then comes down to the next level. Then the engaging with folk actually goes out to the final level."

On one hand she is describing the interconnected and mutually dependent nature of contemporary policy work; she enlists key partners to carry out important tasks and recognises the limitations of centralised policy making bureaus. On the other hand, however, she presents a distinctly structural account of the roles and responsibilities and marries that hierarchy to conventional notions of spatial scales from the national to the local. That there is a distribution of responsibility across different localities and among different actors and that there are different roles for the national government and other non-national actors does not necessarily mean, however, that there is a conventional spatial hierarchy structuring energy efficiency governance. On the contrary, the complex networks of energy efficiency policy implementation described above are multi-scalar and in many cases operate with, beside, and even despite government. Rather than seeing central government as a direct dictator of non-state actors along these traditionally scalar lines of force, (Rose, 1999) the data presented here further strengthen the argument that government increasingly recognises itself as a centrifugal network manager (Kickert et al., 1997) or auditor and attempts to guide the outcomes of networks by creating particular or opportunity structures for those operating within energy efficiency networks to exploit for governmental as well as commercial returns:

"GP: Do you think the schemes are producing new connections or formations? Between businesses, local authorities and social enterprises?

Participant: I think it varies so much. One thing that we have been very careful to say is that there is not one single way to group yourselves ... *We'll set a framework and set the ability for things to happen ... What we're not trying to say is you have to follow route a, b, c to get there.* Work what's best for you in your organisations."
(Government contractor, SR)

The theorisation of interdependency between government, non-governmental actors and quasi-governmental organisations in emergent energy efficiency networks has led to the proposition that policy makers are actively engaged in enlisting a field of actors of various types to co-perform government, as suggested by Rhodes; 'Despite the appearance of formal government from the centre in the UK, government actually operates 'through a multi-form maze of institutions which central government can steer only imperfectly and indirectly.' (Rhodes, 1997, pxi) It is on the last few words of this quotation, '*imperfectly and indirectly,'* that the analysis turns, as the imprecision with which governments now perform network management has significant consequences.

As well as the inequalities of outcomes discussed above there is also evidence to suggest that despite the effective integration by NGEs, the outcomes have not sufficiently reduced national carbon dioxide emissions or the number of vulnerable households in fuel poverty. Evidence of this is that DEFRA (DEFRA, 2008, p15) expect CERT, the major carbon abatement policy for UK homes, to reduce annual carbon dioxide emissions from homes by 2.4%, while in total carbon dioxide emissions from homes fell by 4.6% in 2007. While this is a start it is widely accepted that much more will need to be done to reduce emissions to 20% of 1990 levels by

2020, and 80% of 1990 levels by 2050 (DECC, 2009). In the case of fuel poverty, the government in the Fuel Poverty Strategy Annual Progress Report of 2008 admitted that they would not hit their target of totally eradicating fuel poverty from vulnerable households by 2010, citing economic and technical factors as obstacles to achieving this (DEFRA, 2008). That so much work has been done by NGEs to coordinate the otherwise disconnected limbs of domestic energy efficiency policy, yet that nationally progress is so limited suggests a problem with the national governance framework structuring the challenges and opportunities presented to NGEs and householders. The outcomes of the policies question whether the programmes were ambitious and far reaching enough, and in Chapter Six attention turns to the processes at work in designing these policies, and the political economies shaping them.

5.6 Conclusions

The chapter has argued that modes of coordination and implementation established in the early phases of policy integration and which have since matured are beginning to overlap with other, often more powerful energy governance projects. This situation is exacerbated by the fact that the future of the policy programmes themselves is uncertain, as current consultation processes suggest that EEC / CERT and Warm Front will come to an end in 2011. This new emergent phase is only just about to unfold so the details cannot be included in this study, but further research in Newcastle and the Eden District, which would study the 2008 - 2011 phase of energy efficiency governance, would be fruitful and could benefit those authorities who are currently setting up Warm Zones, of which there are many throughout England.

The chapter has examined the organisations involved in connecting householders with governmental institutions and has argued that in the energy efficiency sector these are often niche governmental entrepreneurs who thrive by performing two functions; firstly they combine governmental diagrams in integrated implementation operations and secondly, they align governmental projects with locally specific socio-techno-economic domestic practices. The chapter has also analysed these organisations and has argued that they are ontologically hybrid and have important inter-scalar and cross-sectoral qualities.

From this position the chapter has suggested that while coordination of policies has been effectively achieved by NGEs, the policies themselves are designed in such a way that even their successful implementation has not brought about the required level of fuel poverty or carbon dioxide emissions reductions. Consultation about how to move forward into a new more effective phase of energy efficiency governance in the UK is currently wide ranging, as evidenced by the much heralded but ultimately ineffectual Fuel Poverty Summit held by the major national policy network actors in April 2008 and which is discussed in Chapter Seven. However a central conclusion drawn here is that if we are to understand why the current suite of policies can be effectively, if unequally, implemented but not adequately reduce carbon dioxide emissions or fuel poverty, then the role of the state institutions in managing the actors involved in designing and delivering its instruments must be examined. Chapter Six focuses on these national level policy relations, and examines the strategic and political processes

that framed the current suite of policies and which precipitated the emergence of the intermediaries examined above and which continue to structure their activities.

Chapter Six: Policies, Markets and the State

6.1 Introduction

"We want to give suppliers more flexibility, number one. Number two, we realise that we want to try and support the development of markets ... and to help the industry to grow and develop over time because looking out to where we need to be by 2020, on both fuel poverty and carbon ... we need to have policies that support and nurture that development, and create incentives." (DTI, PM))

This quotation provides an insight into the way that central government sees energy system transformation and the role of NGEs in the process. This chapter focuses on the nature of the national policy making processes in the contemporary energy efficiency field in the UK and the effects of these processes on the intermediaries and householders studied in the previous chapters. The intricacies of policy design demand close attention to be paid to interaction, overflows and turbulence between and within policies and markets in order to better understand the emergent marginalisations created by the governmental calibration of the new carbon economy.

The chapter will focus on the integration of the major relevant policy instruments in the UK and in particular on how the Energy Efficiency Commitment (EEC / CERT) is integrated with the Warm Front Grants Programme and the Decent Homes Standards

to explore these issues. What follows explores the ways in which the UK government has attempted to control and direct the flows of energy efficiency markets in certain directions and the problems that emerge as these efforts struggle to contain the dynamic multiplicity of their socio-technical relations. In the chapter I detail the problems associated with the programmes including new marginalisations of particularly vulnerable groups. A key term in this analysis is marginalisation, which is used here to refer to the way that particular groups are made relationally remote from resources and networks that they might otherwise benefit from, often to the extent that accessing them becomes problematically difficult, so it is a relational marginalisation that I seek to illuminate.

In examining the process through which the national government actualises its diagrams of low carbon, low cost domestic energy the chapter analyses the strategic nature of the policy process and the power dynamics involved in consultation processes. The outcomes of this kind of political and deliberative policy making are examined by considering the ways in which possible future energy scenarios are curtailed by technical, political and economic limitations. Following this, the value of reimagining what markets might be able to perform is considered (Smith, 2005) by reflecting on the ways in which the EEC/CERT markets have been designed to perform key welfare functions as well as operate as market based policy instruments.

6.2 Policy Integration and Outcomes

This section of the chapter deals with the social and material lives of the major governmental projects; these are the overflows that result from a mode of governing in which the diagrams of low carbon, affordable domestic energy are imprecisely and imperfectly actualised through the strategic creation of economic conditions. The processes animating the problematic social and material lives of policies are not always entirely unforeseen by designers, rather they are often the consequences of sidelining certain demands and fore-grounding others - through strategically selective policy making.

It is worth restating here the socio-technicality of the economic networks with which energy policy interacts. The potential for a policy to 'strike back' (Callon, 2007) is a result of its complex socio-technical careers. The tensions between the fluidity of political goals which move at the speed of discourse development, and the durable materialities among which they must operate are critical to understanding the 'swerve' (Kwa, 2002, p45) that is imparted into policy trajectories, which turns a line of governmental intent into swirls of consequences, as Hudson observes:

"There often are unintended (and overtly spatial) effects as well as – or instead of – intended outcomes, in part because regulatory processes interact contingently with existing patterns of uneven development and historically prior uses of space."

(Hudson, 2005, p10)

That economies and culture are unavoidably co-constituted by the social and the material is old news, as, among others, at least Marx and Foucault have taught us as much. (Law, 2002, p24) Callon's notions of distributed techno-economic agency and the way in which processes very often *overflow* the confines of their purposes however provide powerful ways to conceptualise the integration of socio-technical energy systems in networks of economic entanglement. The connected nature of these systems is critical to the network analysis being conducted, as following the lines of relation between actors touched by the major policies, the economic systems into which they are involved with and the technologies which permit, require, facilitate or constitute these relations provides a method for illuminating the problematic outcomes of the framing and selection processes of policy processes. What follows is the description of the flows (Hudson, 2005) and overflows (Callon, 2007) which have created new heterogeneous assemblages in emergent energy economies. Scrutiny is also directed at the never ending re-production and regulation work that must go on in order that these various effects are folded back into policy design processes which themselves are not one-shot acts of creation, but rather an iterative and perpetual task of politically saturated maintenance and repair.

6.2.1 The Energy Efficiency Commitment

The EEC/CERT is a major policy programme which aims to contribute to the UK government's Climate Change Programme (DEFRA, 2006) by cutting carbon dioxide emissions from British homes. It is important to acknowledge that the EEC/CERT has been and continues to be successful in many ways, and the thesis does not seek to undermine the considerable achievements that the EEC/CERT has made within its

terms of operation since 2001[6]. The observations that follow, however, hope to contribute to a conversation about how to move beyond the EEC/CERT into the post 2011 policy world.

The EEC/CERT is the successor to the Energy Efficiency Standards of Performance (EESOP) and creates obligations for gas and electricity suppliers (retailers) to "achieve targets for the promotion of improvements in domestic energy efficiency" (DEFRA, 2008) by delivering a certain quantity of 'fuel standardised energy benefits' in set three year periods. Energy benefits can either reduce the amount of energy used in order for a household to achieve the same level of energy service, such as needing less energy to heat the home to a certain level thereby reducing carbon dioxide emissions, or they can represent improved levels of energy service, such as a warmer home for the same level of energy use, thereby not reducing emissions but improving thermal comfort without increasing fuel bills. In the scheme energy retailers are allocated a target amount of energy benefits which they must generate (although as of 2008 these targets will become Carbon Emission Reduction Credits, under the third phase of EEC, the newly named Carbon Emission Reduction Targets (CERT) [DTI, 2007]). At the end of each EEC/CERT period the Office of Gas and Electricity Markets (OFGEM), the market regulator, provides accreditation for the energy benefits. The energy retailers must pay for the energy benefits they create themselves, although they do to a greater or lesser extent pass the costs on to their customers, as even DEFRA concede; "householders are assumed to bear the full energy supplier costs via their energy bills." (DEFRA,

[6] EEC/CERT saved 61TwH of energy between 2002 and 2005, 98% of its target, and is set to achieve 100% of its 130TwH target for the period between 2005 and 2008 (DTI, 2006).

2007) This creates commercial pressure to achieve maximum energy benefits at minimum cost, a pressure that is exerted, dissipated and transferred in various ways. Principally, this means that the measures most often used to meet these targets tend to be cavity wall and loft insulation and low energy light bulbs (Lees, 2006).

6.2.1 A Technology for Actualising Diagrams

Having outlined the policy, the intention here is to argue that the EEC/CERT can be seen as a means of actualising a governmental diagram of low carbon domestic energy use. It is under this light that its ability to animate a landscape of many actors is illuminated; humans in various groupings, as one might imagine, but also many others – significant nonhumans which also come in various formations such as buildings, utility infrastructures, energy technologies and so forth. There is an important redistributive effect at work however, which provides an interesting example of government using what it sees as a market to perform a welfare function, and which calls into question the extent to which 'funny markets' (interview with Energy Policy Charity) like this can create particular distributive outcomes. Although all customers pay for the EEC/CERT through their utility bills, written into the EEC/CERT is a requirement that at least 50% of that money must be spent on energy benefits created for a 'Priority Group' who are in receipt of income, disability, incapacity and housing benefits, although this will be reduced to 40% under the third phase of EEC/CERT. So, uniquely, the policy is a carbon reduction mechanism with a social equity mechanism built into it. The Priority Group is seen by many as a fuel poverty measure built into the EEC, despite interviews with policy makers suggesting that this is not the case, as stressed by a programme leader in interview:

"GP: Is the priority Group there because EEC/CERT was partly designed to tackle those vulnerable to fuel poverty?

Participant: In fact it wasn't. It wasn't designed to do that. I think that's a common misunderstanding." (DTI, IR)

The senior civil servants interviewed insisted that the Priority Group was designed to mitigate what government sees as the market's natural tendency to favour the wealthy and exclude the poorest members of society. In creating the EEC, the government is trying to push domestic energy related markets into a particular, more equitable, shape. In doing so however they are creating marginalities in different places, new exclusions that alienate groups in ways that the EEC/CERT designers are still struggling to understand and respond to in the several rounds of what Brenner might refer to as 'incessant regulatory experimentation.' (Brenner, 2004, p304). The chapter will proceed by firstly examining how the EEC functions and secondly, by assessing what overflows from the programme by scrutinising the definitions and exclusions made by the EEC/CERT which collide problematically with durable materialities such as the ends of energy infrastructures and economically awkward dwellings such as solid walled homes.

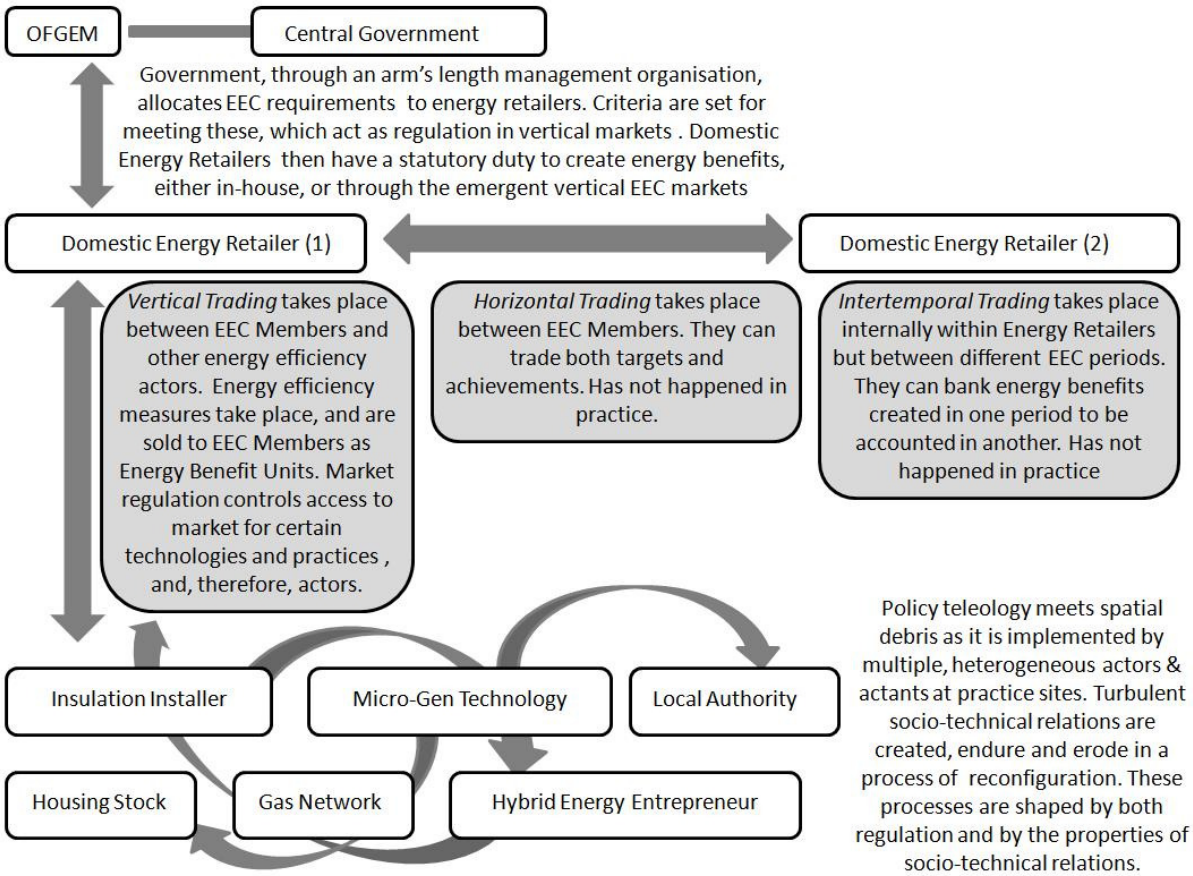
6.2.3 EEC / CERT Trading

EEC/CERT is at heart a market based policy instrument. Trading in the EEC/CERT can take three forms (NERA, 2006), as shown diagrammatically in Figure 1. Firstly,

horizontal trading can be the trade of either obligations, or the trading of performance against obligations between energy retailers. Horizontal trading has never actually happened in five years of the EEC/CERT's operation and while there are several possible explanations they are not the focus of this thesis. Secondly, inter-temporal trading allows energy suppliers to create energy benefits and 'bank' them for use in future rounds of the EEC. This is very common, accounting for approximately 42% of EEC2 energy benefits (Sorrell et. al., 2006) but the trade happens between time periods, not organisations, and is essentially a risk management device that many retailers use to reduce uncertainty about their future ability to create EEC/CERT credits. Thirdly, vertical trading, by far the most active and dynamic form of trading, allows energy retailers to buy energy benefits from other types of actor in the domestic energy sector, such as local authorities, housing associations, installers and retailers of energy efficiency products, and, increasingly, the hybrid organisations discussed in the previous chapter which gather actors like these into new formations. What happens on the ground as a result of the way that the vertical markets are structured is that firms install, mostly, insulation and lighting measures as contractors of the energy retailers and the physicality of the work is a material manifestation of the mobilisation of the objectives of the Climate Change Programme via the vertical market. The energy benefits which the installations are equated to are the products of environmental and economic knowledge making processes; it is in the vertical markets that the ontological cocktail of ideas about the environment, climate change and 'the market', materialities, technologies and humans are forced into relation.

Vertical trading animates the EEC/CERT by providing a mediation protocol which opens up the energy landscape in such a way that the EEC/CERT project can perform its work of creating units of fuel standardised energy benefits - which it has done very well. But it is when EEC/CERT activity happens, when its discursively created, tradable units of environmental responsibility are turned into real material measures in buildings, that discursive policy flows from government encounter spatial debris in the form of actors and actants, creating turbulence. It is through this process that the state goes about actualising the governmental diagrams of low carbon and affordable energy futures discussed in Chapter Two. By creating EEC/CERT standardised benefits and making them tradable the state has created a protocol which sets the terms on which actors involved in the energy efficiency sector can relate with one another, and as such is able to influence the ways in which the nascent energy efficiency economy will be assembled. Their influence is limited however, as is developed below.

Figure 6.1 EEC/CERT Markets



6.2.4 Integration with the Decent Homes Standards and other Local Authority Targets

This briefing from the EST, which reads almost like an invitation, illustrates the incentives to create partnerships between social housing providers and those energy suppliers large enough to be involved in the EEC / CERT (all those with more than 50,000 customers):

"Local authorities can influence how and where EEC money is spent so as to benefit their tenants and the householders in their area. EEC money could also play a

contributory role towards delivering HECA targets and a range of objectives set out in council and partnership strategies, such as affordable warmth and environmental strategies. Working in partnership can minimise administration for energy suppliers whilst allowing housing associations and local authorities to influence proposed efficiency measures to best promote their tenants' interests. ... Social housing providers can bring real benefits to their tenants, such as reduced bills and increased comfort, whilst contributing significantly to the reduction of carbon dioxide (carbon dioxide) emissions." (EST, 2007, p6)

6.2.5 Marginalised Political Spaces and Under-Entanglement

While the EEC/CERT programme records energy improvements of various kinds on a standardised scale, in practice these have been mostly insulation and low energy lighting installations. The programme has resulted in over 1.5 million insulation installations in the first EEC/CERT period (OFGEM, 2005) alone, and as a member of the DTI's EEC/CERT team commented: "To some extent by 2011, EEC/CERT will have done its job, it will have filled most of the available cavity walls." (DTI, PM).

More than simply installing insulation though, the governmental definition of the EEC/CERT Priority Group subsidy system has been part of a re-configuration of the political space surrounding the energy retail markets. Low income households have been indentified for assistance by using eligibility for benefits as a proxy for identifying those least able to afford to trade with the energy suppliers and their associates operating in the vertical EEC/CERT market. The efficacy of using benefits

to identify those most in need of energy interventions has been questioned by several members of the energy policy community, many of whom argue that using a single economic measure to identify those struggling with a complex and multi-faceted set of problems is inadequate. The participants interviewed however argue that the decision to use low income to define those in the Priority Group was as much a pragmatic decision as it was a strategic choice, however:

"I think in terms reaching people it's (The Priority Group) an effective route because you've got the information there and you can access the data and you can get to some of the people who are the lowest income households and, therefore, who are in some of the greatest risk. That's what you're looking for, something you can deliver in a coherent and consistent way. We're not saying it's 100% perfect by any means ... It's a perennial problem - you can't tell walking down the street which of the houses are fuel poor." (DTI, JH)

What is missing from this account of pragmatic policy making offered by central government representatives is that certain groups at particular risk of suffering from high energy costs are excluded from the energy efficiency market place because of the way that the market logic of the EEC/CERT has structured both the basket of goods and services that is likely to be provided, and the cost of access to it. While among the energy suppliers and the wider group of policy actors it is accepted that the EEC/CERT does implicitly play an important part of helping government meet its statutory targets on fuel poverty, evaluations of the programme, including contributions to the current consultation process, express concern that many

households vulnerable to fuel poverty are not able to gain access to EEC/CERT measures, and that there is serious inequality in the way that it interacts with the fuel poor. From the perspective employed in this thesis, it is clear that the way that the vertical markets in EEC/CERT are structured makes their integration with implementation of the Decent Homes Standards hampered by technical and economic barriers.

There are several ways in which these imperfections plays out, all of which stem from the fact that climate change and fuel poverty networks share many social, technical and economic relations. As NEA observe, "...the priority group has not delivered equity. Priority group households in the social sector and those with cavity walls have had greater access to measures than those in the private sector and those living in properties with solid walls." (NEA, 2006, p2). The two most significant ways in which the imperfection affects householders are explained here: Firstly, for those in the private sector of the housing market this has been a problem because those in the social sector have benefitted from the way that registered social landlords have been drawn into techno-economic relationships with energy retailers[7]. This has occurred because their shared incentives, to meet EEC / CERT and Decent Homes Standards targets has led them to co-fund the energy efficiency work of a third party NGE, such as Warm Zone. As a result the social landlord and the energy retailer have met their target in full at approximately half the cost that they would have faced had they not been drawn into

[7] In 2004 OFGEM admitted that "The delivery of measures to the Priority Group has generally been via cost effective partnerships with social Housing providers to deliver insulation measures in bulk." (OFGEM, 2004, p3) and the situation had not significantly changed by 2008; "activity carried out with social housing providers was popular with suppliers as it allowed them to target large numbers of Priority Group households and to lever in additional funding." (OFGEM, 2008)

partnership by the NGE who is able to exploit the commercial niche presented by this confluence of funding streams from local social landlords and the national energy retailers.

Secondly, there is a distinction to be drawn between those in easy to treat and hard to treat homes[8]. Those in homes with cavity walls and empty lofts and which are connected to the national gas network are able to take advantage of the discounted mainstream measures funded by the EEC / CERT and by the Decent Homes Standards and Warm Front. The pressures exerted on the actors involved in these policies are commercial ones and as a result NGEs discussed in the previous chapter carrying out the implementation alignment work are forced to create the most possible energy benefits for the least possible cost. In the UK energy efficiency market place the way to achieve that is to focus on installing low energy light bulbs but most especially cavity wall and loft insulation. Because of the index of energy benefits used to calculate the energy savings of a standard installation, all actors involved can record the highest energy savings per pound by installing insulation. This skews the way in which the money spent on the measures is distributed for although all bill payers contribute to the EEC/CERT programmes of energy retailers, those who have homes technically able to be insulated in these ways will benefit most from the work of NGEs to integrate the programmes. Individuals not in these groups, on below average incomes, particularly vulnerable to fuel poverty, will not belong to the Priority Group.

[8] Cavity wall insulation accounted for 53% of all measures in EEC 1 (2002-2005), (EST, 2007), and 57 % of measures in EEC 2 (2005-2008) , (OFGEM, 2008).

Taken together the outcomes are unequal due to *technical* barriers created by the commercial *economic* logics structuring the policy.

These issues highlight the problems associated with the decision to use the Priority Group to make access to the EEC/CERT easier for those on *low incomes* rather than those in *fuel poverty* - a much more difficult group to define and identify. The problematic distancing of socio-technically vulnerable households from the market has been significantly amplified by the durable material inadequacies of many of the buildings that low income households live in. Their homes might have solid walls, poor heat retention, will gain little from passive solar energy and are likely to be poorly ventilated. Households in this position, which will have higher than usual heating costs, are excluded from the EEC/CERT measures due to the least cost logic of the market's structure and as a result are living in spaces which are in conflict with their energy needs.

These are the results of the structuring effects of policy design and these vulnerable make up the strongest currents in the equity overflow being described. Such households are likely to be in fuel poverty but will in powerful ways face resistance in entering into the EEC/CERT marketplace. Their marginality is the effect of them being under-entangled with other actors in the EEC's energy efficiency markets. Various barriers, such as tenure and the high costs of working with 'hard to treat homes' divert them around the EEC/CERT and toward highly vulnerable, disconnected political spaces. As suggested above, the interactions which perform the re-routing are their status as private tenants and low income owner occupiers, the way their home was

built, or their inability to access passport benefits. This is compounded by the economic reality that within the regulatory frames of possibility, NGEs will pursue the least cost route to meeting EEC/CERT and Decent Homes targets on behalf of their clients (energy retailers and local authorities) whose needs structure their activity and who have no direct incentive or moral obligation to tackle fuel poverty:

"As strong as we feel about it, and we do, we can't be solely responsible for eradicating fuel poverty in a country where it shouldn't exist in the first place." (Energy Retail Business, EN)

By choosing to structure the EEC/CERT priority group around low income, a relatively simple variable, rather than fuel poverty, a much more complex and dynamic outcome of several social, technical and economic variables, and allowing market logic to animate its operation, the EEC/CERT has generated problematic interactions with fuel poverty due to the shared material and human components of their respective networks – hard to treat homes and the people that live in them. The result is that the EEC's outcomes are not bound to that which is calculated as the policy's sphere of effect. For the fuel poor, their inability to engage with the EEC/CERT is a less conscious side effect of its more conscious, designed attempts to engage with differently defined groups. They become part of an overflow, pouring out of the EEC/CERT markets. So, rather than seeing the Priority Group ridding the EEC/CERT of externalities such as adverse effects on low income groups, the analysis conducted here illuminates the way that the centrifugal mode of governing and the use of intermediaries to coordinate the national programmes by providing a commercial

incentive to do so had the effect of reconfiguring the adverse outcomes. The problems described above resulted from the economic structuring effects of the incentive based approach policy integration have not been removed but rather have been diverted and amplified in new, smaller but arguably deeper channels which will require further regulatory experimentation (Brenner, 2004). With the third phase of EEC/CERT about to commence in 2008, there is reason to suspect that the regulatory modifications made for this third round will only further amplify this marginalisation of the lowest income groups in the poorest performing housing, as discussed below.

6.3 Policy Repair: Inside the politics of the EEC/CERT regulation processes

"There always needs to be a process of saying 'what's it like out there?' for policy to be as effective as possible." (DTI, KR)

It is crucial to situate this account of the EEC/CERT in the highly emergent context of the consultation process surrounding CERT. The third and final period of trading commenced in 2008 and will operate until 2011. The exact nature of the market was only recently finalised after an extended period of consultation with, among others, academic research bodies, NGOs and elites from transnational energy businesses. (Interview with Senior Government Department Representative) The third EEC/CERT period will be noticeably different to Periods One and Two. It will re-align its focus toward least cost carbon reduction and, to some extent, away from the vulnerable households in fuel poverty. It is critical to highlight this shift in emphasis away from

fuel poverty and energy efficiency in general, toward a more 'pure' carbon reduction market; by rebranding and bringing about a new socio-techno-economic formation a particular kind of market transformation is being orchestrated as a result of two interestingly related changes which are focussed on below. Firstly, there will be a change in the way the policy relates to energy technologies, and secondly, the priority group is changing.

6.3.1 The Priority Group

Although CERT will be double the size of EEC2, only between 35% and 45% of the total spend (depending on the use of the flexibility option discussed below) will be earmarked for the Priority Group. This constitutes a move, of up to 15% of the total spend, further from fuel poverty to carbon reduction which echoes a similar shift in focus between the Energy White Papers of 2003 and 2007 (DTI, 2003; DTI, 2007). The reduction in the Priority Group spend as a percentage of the total spend can be seen as the result of effective pressure being applied to the policy network from the utilities industry who have an interest in reducing the size of the Priority Group. The commercial logic driving this was explained insightfully by a NGE manager in an interview:

"(Government Contractor, JC) It is clearly more cost-effective for a utility to put their money into the 'able to pay' end of the market because they are only going to pay a proportion of the cost and the customer will pay the rest. So the gearing effect makes it more cost-effective for the utility, because they make the offer of 30%, 40%, or 50%

funding on the basis that they keep all the carbon. So the gearing is such that they get at least two, possibly three or four times the carbon for their money."

The politics and the pragmatics of working with the Priority Group have lead coalitions of actors to seek to influence the rules structuring the vertical markets of the CERT. In negotiating the responsibilities placed upon energy suppliers to carry out the work of government in serving the needs of those less able to engage with energy efficiency markets, energy retailers as a discourse coalition have tried to reduce the size of the Priority Group as a percentage of the total spend. They did so because of the added costs of serving the remaining hard to reach Priority Group – those in the priority group not in social housing and who have not engaged with the previous two rounds of the EEC. Indeed, the figure head of the Energy Retail Association (ERA), explicitly states that it is 'lobbying for a 25% Priority Group.' (ERA, 2007, online)

Under the dominant logic of the 'heavy utility lobby', a point is anticipated at which the only available insulation installations are in homes owned by people with whom it is either difficult or expensive to work with, often those least likely to engage with the market or government. So, despite doubling the amount of total 'funding' available for energy efficiency measures to reduce carbon dioxide emissions, which is money that is added on to every energy bill in the UK with no sliding scale for ability to contribute, the new look CERT will move further away from the remaining, hard to reach, hard to treat, poorest households and towards householders who they are able to enrol into market based relationships. This shift is at the expense of the fuel poor households in poorly performing properties, who will now face a 100% increase of the cost of the

EEC/CERT in their energy bills but will only receive 44% of the additional benefits (NEA, 2007), and who are now even less likely to be able to engage with this energy improvements market as it moves into higher value installations with a greater expectation of contributions from 'able to pay' householders. What this means is that the people on the lowest incomes in the poorest housing will now pay double their previous EEC/CERT contribution but will be *less* likely to get *any* benefit.

The most recent developments in energy efficiency policy, which came in a statement from the Prime Minister in September 2008, widely referred to as his 'Energy Deal', pledged an extra £1bn on funding but amplified this potential overflow by committing the UK to more of the same; the extra funding will come mostly from energy retailers or generators. It is feared however that the retailers will, to a greater or lesser extent, pass much of the additional cost on to their customers, making it more like a regressive energy efficiency tax administered, collected and spent through a collection of commercial third parties, further strengthening the argument that the state is governing energy efficiency centrifugally. There is no data regarding the extent to which this has happened or will happen as DEFRA admit (Devine, for DEFRA, 2006), although DEFRA's 2007 admission that costs associated with previous EEC rounds are assumed to be passed on (DEFRA, 2007) suggests that the practice is known to take place. Furthermore, Gordon Brown felt the need to emphasize that he did not expect that the costs of the extension to the EEC/CERT announced in September 2008 would be passed on to customers – at the same time inadvertently making the point that they might be:

"We want to keep energy bills as low as possible and I do not expect the £910 million that we raise to be passed on to the consumer by the energy companies." (Brown, 2008, cited in the Times, September 11th 2008)

The problem here is that the government is to some extent in denial that the EEC/CERT functions as an indirect tax as many fear. (Helm 2008, cited in The Times, September 12, 2008) As a consequence, the quasi-tax cannot be sufficiently controlled to be progressive by being linked to income, as it might have been if administered more directly by the state or been made to respond to a wider range of social and technical variables. Instead, by delivering the programme through commercial intermediaries those with the highest fuel bills will pay the most, as it is added to bills as a percentage of the total bill. Hence the polluter pays. In many cases however, the polluter is often a very low income household stuck in a very rigid socio-techno-economic arrangement of fixed income, poor quality heating and insulation and very little means of engaging with the new projects they are financing.

6.3.2 The Flexibility Option

Called the Priority Group Flexibility Option, the new flexibility introduced in the third phase means that suppliers can reduce their responsibility to spend money on members of the Priority Group by up to 5%, so the minimum Priority Group spend can be lowered from 40% to 35%. This option is available to a supplier who is investing in schemes using more costly measures such as solid wall insulation, biomass heating and ground source heat pumps (OFGEM, 2007, online). This is a direct fuel poverty

modification to the EEC/CERT as it allows the focus on *low income* to be shifted (in part) to the more technically complicated socio-techno-economic conditions of *fuel poverty*, despite every government policy maker who participated in this research project explicitly wanting to distance the EEC/CERT from fuel poverty. It is also the result of lobbying from the energy retailers through the Energy Retail Association (ERA) who recognized that the flexibility option would create new opportunities for energy businesses to develop niche markets while also responding to the fuel poverty problems of the first two rounds of the EEC. The opportunities are to cultivate markets for these less common energy efficiency measures which will typically be installed in the able-to-pay sector by encouraging middle and higher income customers to pay for the installations with the retailer discounting them only just enough to encourage the private investment. That powerful mixture of seeing commercial opportunities tied up with tackling very difficult policy challenges is a potent force directing policy makers. This sentiment was also voiced by one energy retailer in interview. Here they discuss the need for flexibility in order to meet their governmental responsibility to engage some of the poorest members of society with new energy efficiency networks:

"Energy Retail Business, RC: Certainly there is a limit to the number of homes left with cavity walls particularly in the Priority Group homes, there is a limit to what is left in social housing hence we are looking at private housing. *There is obviously a great opportunity for things like solid wall insulation, and yet there is no current government policy or government funding to address that situation*. So certainly as we are going into this next three year period there will be real challenges in terms of identifying and locating priority group households that can be what we want ... In our

target subgroup work what we have said to DEFRA is that we recognise that post 2011 could be different, but at least give us some flexibility in the next three years to trial some things, and that is what we're talking to DEFRA about. So maybe 2% or 3% of the target potentially could be around innovations of tariffs, or metering and things like that."

Later in the interview, the representative went on to comment on the commercial opportunities presented by the flexibility they were pushing to see extended. They were hoping to include behavioural as well as technical measures and thus adding support to the argument that if the market transformation project that the government is orchestrating is to successfully tackle fuel poverty as well as carbon dioxide emissions it requires approaches that enable financial, cultural and technical changes to the way energy use and consumption is structured:

"Energy Retail Business, RC: We would encourage government to allow flexibility, things like innovative tariffs and energy advice, if we are going to get beyond this mass subsidy of volumes of installation and into markets that can work in terms of selling energy services. We've got to take customers with us. We've got to change their attitude and behaviour as well- but that will not happen overnight."

The results of the flexibility option will be quite complicated, and as a result of the processes outlined above, difficult to predict. The reduction in the Priority Group to 40% and the introduction of the flexibility option makes it possible to only spend 35%

of all funds on the Priority Group as defined by benefit entitlement, presenting the threat of the third EEC/CERT phase being particularly regressive as costs to those on low income will be doubled thus taking up a greater percentage of their income than is the case in higher income households and benefits becoming increasingly difficult to access. However, the option to work with hard to treat properties means that it will be more able to work with the fuel poor, who have, in this final incarnation of the EEC, been brought inside the frame of regulation. That a wider range of technical measures, such as solid wall insulations and ground source heat pumps, are to be encouraged via the flexibility option is largely a reflection of the durable inflexibility of the pre-existing housing stock and its refusal to bend to the governmental diagrams of least cost, market based implementation shaping of the EEC / CERT: millions of cavity walls have been filled in EEC/CERT Periods One and Two, and many actors fear that this inexpensive and technically straightforward means of creating EEC/CERT credits will soon become difficult to maintain in its current form, as several interviewees stressed: "To some extent by 2011, EEC/CERT will have done its job, it will have filled most of the available cavity walls. Where do you go from there?" (DTI, PR).

This modification, to increase flexibility in creating credits, is a significant feature in the re-designing of the EEC/CERT. It would appear that the further integration of a wider range of technical measures into the programme gained political momentum due to its alignment of energy suppliers' long term commercial interests in developing markets in new technologies and the fuel poverty lobby's interest in recalibrating the EEC/CERT to better target certain groups more vulnerable to fuel poverty than their eligibility for income benefits would suggest. A modest amount of flexibility built into

the definition of the Priority Group spend would allow the policy to work flexibly with and around the durable and resilient pre-existing socio-techno-economic assemblages found in homes and communities it presently collides with.

The kinds of properties and technical circumstances that cause some of the most problematic overflows, such as where walls or lofts cannot be insulated, or where properties are disconnected from the natural gas network, have been politicized in a particular way by the fuel poverty lobby as 'Hard to Treat Homes'. The recognition that certain homes can not presently engage with the EEC, or other energy efficiency programmes, has been the achievement of lobbying, direct consultation and highly evolved policy work by the fuel poverty discourse coalition in formal and informal consultation spaces. The result has been that 'Hard to Treat Homes' have been written in to the third phase albeit only in a small way - their stubborn materiality addressed by creating commercial opportunities to link national policy with particular building integrated technologies, a socio-techno-economic structure that generates a higher degree of responsiveness than previous, more tightly framed and exclusionary phases of the EEC/CERT could not.

While this is a significant development, a bigger and more consequential market making process is also underway. The EEC/CERT will end in 2011, at which time, it is widely speculated, a new energy efficiency market will open in the UK, which will hopefully benefit from the experiences of the successful but not untroubled EEC/CERT to make even greater progress in carbon abatement and fuel poverty alleviation. What that market will trade, the extent of its integration into other markets

and indeed virtually every aspect of its organisation are currently at an early stage of consultation. (Interview with Senior Government Department Representative) The point being made here is that the potential futures that might be brought into reality through deciding how to structure the new, post 2011 energy efficiency economies are multiple, and it is part of our role as social scientists to engage in this onto-political process of market making with an understanding of the various welfare, environmental, as well as political and commercial functions which such markets might be able to perform, precipitate or prevent (Smith, 2005; Mackenzie, 2006). The process of constructing policies capable of performing such functions through interactive, deliberative but strategic processes is examined in the following section.

6.3.3 The Process: Strategic Selection

These analyses of the size of the priority group and the nature of the flexibility option suggest that before policies can be written and go on to have effects in the real world, the competing narratives of overlapping, heterogeneous discourse coalitions must go through a filtering process.

Hudson and Jessop agree that state policy design is 'strategically selective' (Jessop, 1990, Hudson, 2005), and imposes 'filters on the content of policy and upon who is included in and excluded from debates about policy and the policy agenda.' (Hudson, 2005, p96) It is at policy design nodes within government departments and in consultation processes, stakeholder engagement forums and myriad other exchange points distributed through policy networks where socio-techno-economic narratives

about fuel poverty and climate change meet and are forced into policy projects. The possible effects of a policy are only imperfectly known as this strategic selection takes place, but it must take place in order for policy to be created so - the shutting down of certain future states of interaction in order to make others possible is conducted in the knowledge that it is an inexact and politically contested process. In doing so the state is 'picking winners' and trying to structure future socio-techno-economic relations in energy efficiency economies. The menu from which these future scenarios are chosen however is in many ways shaped by a variety of discourse coalitions. Each policy document and the hinterland of socio-techno-economic practices that it will attempt to structure can be seen as a hybrid product of the interaction between competing coalitions. Furthermore, while the chain of events each precipitates will always overflow its design, it will also in powerful ways be influenced by it, as the analyses of the EEC / CERT above illustrates.

Identifying the strategic selection of policies from the overlapping, mutually exclusive suite of demands made by heterogeneous policy coalitions highlights the political choices made by, and made available to, governmental actors. To scrutinise this further the role of the coalitions in applying pressure to government institutions and determining the narrative, technical and economic options available to policy makers.

"GP: What voice do NGOs have at the national policy level and how real is that voice?

"Parliamentary Advisory Group, PL: I think any decent pressure group should stretch you - they want to solve a problem and they aren't subject to the same constraints as

you are. So that pressure is quite helpful. There's a lot of innovation that comes out of those groups and … it's about finding a balance in the argument." (Interview with Government Department Representative)

"GP: Are there any particular disjunctures between fuel poverty and climate change?"

DTI, IR: Tension is I think more of a given, and as a minister you've got four goals for energy policy and in some areas you can tick the box for all four. In some areas you can tick one and it puts big crosses in the other three. As a politician you have to weigh those up. As it should be." (Interview with Government Department Representative)

"DTI, PM: To give you an example on the one hand we've got Greenpeace who are lobbying to say that no way do we want more nuclear power stations, on the other hand you've got the British public who would be in uproar if the lights suddenly went out ... So you've got to balance those competing demands." (Interview with Government Department Representative)

"GP: How do you experience that relationship between the two issues, if you were to characterise it?

DTI, PM: I think there are a lot of synergies between the two but there are also some tensions. We have an instrument which is primarily about carbon abatement. It's not a fuel poverty tool but we have priority group within it for reasons of equity which I'm sure you're familiar with, and there are three variables which ministers would like to optimise. Firstly, if you like to maximise the energy efficiency and carbon abatement

benefits; secondly, they like to minimise the cost of doing that, and thirdly, they would like to maximise the degree to which it can assist them in delivering their targets on fuel poverty. So if you think of them as three different points in a triangle the difficulty is that when you pull one point on that triangle it tends to be that the others move, and they don't necessarily always move in a positive direction."

These quotations support the central argument that the policy makers find themselves exposed to competing pressures when trying to create energy efficiency policy and have a limited capacity to determine policy design (Sorenson and Torfing, 2007). This is because they must resolve the differences between the competing narratives bound up within different discourse coalitions as well as their material and economic relations. This observation, although not novel (see Schmitter and Lehmbruch, 1979; Marsh and Rhodes, 1992), is an important one as it suggests that the problematic outcomes of policies, their social and material lives are the result of the prioritisation of certain objectives over others at important design and re-design junctions. The interview above in which a government department representative uses a triangle with interconnected points to characterise the competing but physically interlinked challenges of energy efficiency in the UK communicates well the impossibility of intervening on one policy goal without also affecting the others, thus strengthening the argument that not only do humans and nonhumans share narratives in discourse coalitions but that discourse coalitions share things, and that because of this overlapping the narratives they construct are impossible to address without having effects on other discursively discreet but materially connected narratives.

"GP: The last question is about the consultation process for EEC/CERT. How real an engagement is that process and what function does it serve?

DTI, JH: It's critical. It is a critical part of the policy process but it is not the only part. … The way the process is developed is that we need to go out and get their views, get the evidence, we need to test analysis and it's very interactive. ... Suppliers, fundamentally, would prefer EEC/CERT not to be doubled, and from there to be no priority group, but that is not consistent with the government's policy line. …But what we'll never get from a consultation process and what we'd never expect is a homogenous view - we'll get a full range, and we'll need to assess and analyse you know those, and take away what's helpful in moving the policy forward."

This answer suggests that government feels that policy making must be open and inclusive in order that work can be done to create socio-techno-economic outcomes which are within limits of tolerance of the various discourse coalitions involved. In the quote the size of the EEC/CERT and priority groups are being consulted upon so that discourse coalitions can input into the re-design of the policy. It, and others above, suggest that government departments *rely* on discourse coalitions to help identify the boundaries; to put them under pressure by setting an agenda in such a way that it frames what is politically, technically and economically possible for the government departments. In doing so discourse coalitions are active in drawing up a menu of viable options for dealing with the marginalities or other problematic socio-techno-economic outcomes of already existing policies frameworks.

This work of discourse coalitions to loosely frame a menu of policy options requires government departments to make what Jessop calls ‘strategic selections’ (Jessop, 1990), as the following interview excerpt illustrates.

“GP: Do you think the three variables (climate change, fuel poverty and economic efficiency) are ranked in order of priority at all?

DTI, KR: No I don’t think so, because they are all considerations for ministers. What ministers do and what we seek to support them in doing is to consider the analysis and the evidence... But all of these things are ultimately judgements. They are subjective - we've come out with a 40% priority group [in EC 3]... Now the fuel poverty advisory group is arguing that no, no, no the priority should be higher - 45% or 50%, but the energy supply companies are arguing that it should be lower, 25%. So ultimately ministers have to take a political view and how the different considerations are balanced and whether that is an effective way of proceeding. We give them advice and recommendations and analysis to help support that decision.”

The quotation highlights that the tensions that government is under from competing discourse coalitions are very real and that government feels that they do in powerful ways set limits on the possible ways future policies might structure practice. However, it is also evidence that the governmental departments retain this strategic role. This is an important point in the argument that the state is still a powerful actor in structuring the practices and terms of interaction between actors and actants in energy efficiency

networks as Chapter Two argues. It is in making this point that the governance debates can be augmented by the work of Brenner, Hudson and Jessop. The framework developed in Chapter Two is one in which the emphasis on networks and the power of civil society in policy making is tempered by recognising the powerful structuring role retained by the state and the analysis of these interview excerpts suggest that recognising that balance is important to an adequate theory of the roles and relations between state and non-state organisations as is further analysed below by using the idea of a centrifugal state.

6.3.4 Strategic Selections within Discourse Coalitions

While discourse coalitions are able to exert pressure on policy makers, they themselves are subject to competing pressures, as Hajer observes; "(discourse coalitions) can be fractured and contradictory." (Hajer, 1995, p1; see also Koppenjan, 2007) Inside networks which appear to be consensual and organised around a particular set of fuel poverty, climate change, or commercial objectives, there are also a variety of competing pressures, which are often concealed by the black boxing of policy networks as internally homogeneous (see Koppenjan, 2007). While Hajer states that coalitions can be fractured little attention is given to the *work done* by key members of the coalition to overcome these tensions and the effects of this work on the outcomes achieved. This point is the first of three contributions to Hajer's thesis and is developed though engagement with the data below which suggest that this process of strategic selection and constructed unanimity can be traced back into the often homogenised coalitions attempting to steer policy outcomes where similar silencing and amplification processes are strategically important in order to apply pressure to

other actors in the policy process. Furthermore, the practices of maintaining and holding together coalitions are at least as important as the narrative projects which other scholars argue structure their operations.

"GP: Within the group how would you describe the power balance between members, or types of members?

Parliamentary Advisory Group, PL: The group is a broad church. A wide range of members come in from a wide range of places.... On many issues there is consensus and common agreement, and some there isn't. The suppliers are generally in - they generally don't make a great fuss because of the other ways of making their views heard. Generally on issues where there are sharp differences they tend to get out voted – it doesn't happen that often but it does happen occasionally on a few issues around EEC/CERT and what have you - but we try to carry them all along as best we can, but where there is one group who are having difficulties with something I would try and, you know, keep the show on the road, keep them talking."

"GP: To what extent do you think they (energy suppliers) share these objectives?

DTI, PR: It's a difficult one because you have to see supplier X, or supplier Y. To say suppliers, it doesn't quite work that way. They've all got different sorts of portfolios of expertise and so you do have some tensions, you know, they have a different corporate strategy."

These interview excerpts illustrate the contested nature of discourse coalitions. Previous policy networks theorists would recognise these internal disagreements within networks and in this regard the fuel poverty coalition has some of the characteristics of a 'policy community' and some of an 'issue network' (O'Riordan and Jordan, 1996; Bulkeley, 2000, p729). The fuel poverty coalition is, like policy communities, both strongly institutionalised as a result of years of developmental work and its members share values and world views but, like issue networks, there is more than one government department involved and there is not unanimous agreement about how to resolve issues. Furthermore, as the issues on which coalition constituents disagree are often practical, operational issues presented by the challenging technicalities and economics of energy efficiency as well as ideological, it makes sense to go beyond thinking of the governance in this field as being animated by discursively structured policy communities or issue networks but instead to theorise actors as belonging to heterogeneously constituted coalitions, as suggested in Chapter Two.

The quotations highlight the multiplicity of voices that are strategically integrated in discourse coalition policy narratives and which must be distilled into a coherent, internally consistent line of policy pressure. The deliberate negotiation of a policy line inside what might be seen externally as a consensual space of agreement is seen as a crucial part of applying pressure to the government. Firstly, it is necessary if the coalition is to effectively exert pressure on government, as without an internally consistent lobbying position the pressure achieved by the mutual enrolment of several actors and organisations would dissipate rather than be concentrated on influencing policy. Coalitions presented as singular voices in policy debates, and often represented

by organised collective identities, such as the Fuel Poverty Advisory Group (FPAG), the Public Utilities Access Forum (PUAF) or the Energy Retail Association (ERA), are themselves the product of politically strategic selection processes. While governments are required to produce singular, implementable policies that overcome the contestation of their creation, the coalitions applying pressure to government are also required to choose a line and push particular points if their collectively achieved agency is not to dissipate. In order to do so, internal differences must be resolved or over-ruled in order for the network to maintain its power. The members of the network must be constantly re-enrolled on the terms of the more powerful actors and actants in order to preserve the identity of the network and, crucially, its political potency which is no more than its ability to speak for an assemblage of heterogeneous actors and actants with a singular voice and direction of pressure.

Secondly, key members of the coalitions, such as some of those interviewed, see one of their responsibilities as being to 'keep them talking', in order to maintain the network. This second point suggests that the network's power to influence policy is an outcome of its ability to gather other respected actors and to speak for technologies such as smart metering, and that to lose this collected identity by allowing the network to break down as a result of disagreement would be to scatter the influencing power presently assembled. This point is arrived at by implementing the conceptual framework developed in Chapter Two to focus on the practices of government rather than the project. By this it is meant that previous studies of discourse coalitions and policy networks have focussed on the discursive projects and narratives which are thought to tie the actors and actants together and structure their interaction (Lovell,

2008; Smith and Kern, 2009). The argument made possible by focussing on the work done, and the ways in which connections are *made* between discourses, humans and non-humans is that without focussed, strategic policy work discourse coalitions would dissipate rather than cohere as narratives would become overly entangled with and obstructed by other storylines.

6.3.5 Overlapping Coalitions

The following quotations develop this argument by illuminating the challenges and opportunities presented by the considerable overlap between the fuel poverty, energy retail and climate change networks. Noticing how coalitions in energy governance overlap with one another due to their connected material components is the second way in which the thesis develops the discourse coalition concept.

"GP: How does *(the network)* manage some of the conflicts around energy? Its stated aim is around fuel poverty but I imagine that you're never very far away from some of the carbon abatement and environmental issues that surround it? How is that tension managed?

Parliamentary Advisory Group, PL: Yep. Two things there; firstly there are big synergies as well as tensions and I think the group sees those synergies as very important and therefore focuses quite a bit on them. Where there are tensions we will pick up fuel poverty issues more sharply while being responsible about it because a lot of us are involved in the climate change issues as well."

“GP: Is the climate change issue something that you can ride on the tail of? Is it an opportunity?

NGO, RC: One of the tensions is in getting ministers’ attention, and I think it's fair to say that some ministers are relatively more focused on climate change now than on fuel poverty, and that's more than in the past several years - riding on the coattails is very important. Plus there are other synergies, as you know through your NEA connection; making homes more energy-efficient and developing new technologies that require less energy are both good for carbon reduction and for fuel poverty

In this quotation the strategic nature of the fuel poverty coalition’s lobbying is discussed. It suggests that they can take advantages of changes in related networks that present opportunities. Here the fuel poverty network is able to take advantage of the rising profile of the climate change and its ability to discursively restructure the policy landscape providing an opportunity for the fuel poverty coalition to “piggy back” on it and amplify and distribute their own messages to an increasingly more receptive policy audience.

While there are tensions and struggles over which coalition members are able to exert most influence over its direction, it is observed that powerful actors in other coalitions, such as the energy retailers, are not necessarily powerful in this coalition as a result of the terms of their enrolment. As is developed below, when discussing key operational partners, they can however subvert the fuel poverty network and use other techniques and pathways to influence policy.

6.3.6 Technically Contingent Coalitions

Another important extension to his argument, and the third contribution the Chapter makes to the discourse coalitions literature is that it is often through the very technicality of energy networks that the overlapping of issues occurs and around which discourse coalitions are able to formulate their positions. An energy supply infrastructure is to the energy retail network a means of serving a market, to the climate change network an opportunity to reduce carbon dioxide or invest in renewables, but to the fuel poverty network it can be a system of exclusion or exploitation. The example of the prepayment meters is a case where tension between and within networks is felt, but it is through reference to the meters, even including physical visits to demonstration venues, that the network is able to formulate a position (see FPAG, undated) and create a new way in which to apply pressure on other actors, most notably the energy retailers and the national government departments. The following is only one example of several points made by FPAG, in response to an OFGEM consultation on smart meters. It demonstrates the way that attempting to bring about changes in the way that energy use practices are structured must be achieved through thoroughly socio-techno-economic means and that the exact trajectories taken are influenced in powerful ways by particular technologies:

"For all users the ability to pay by phone would produce savings in costs and reductions in inconvenience especially, but not only, in rural areas. There are other

advantages from these meters ... (including) remote prepayment/credit switching, consumption displays, potential for time of day tariffs." (FPAG, undated)

As discussed in Chapter Two and as Barry argues, social networks are always also technical networks (Barry, 2001). In the case of energy efficiency governance, the coalitions and the policy positions they adopt and the trajectories they help to steer are in powerful ways organised by the particular technical limits and capacities of energy use settings. Indeed, a policy position that was not organised around a practically and technically implementable diagram of energy use would not be recognised as a valid narrative. This might seem to be a statement of the obvious, but it underlines the centrality of the technical to political processes often conceptualised as being discursively shaped. In view of this, it would seem that for discourse coalitions in energy efficiency governance the strategic decisions made about how to most effectively influence policy have technical dimensions. These technical dimensions of the policy process are analysed further in the following section which brings together the observations about the roles of discourse coalitions and the strategic, hybrid nature of energy efficiency governance.

6.4 The Nature of Energy Efficiency Governance

6.4.1 Hybrid Policy Design

"The spaces in which 'the economy' is made possible must be politically and socially (re)produced."

(Hudson, 2005, p97)

The discussion above about the strategic nature of influencing and designing policies is central to the understanding of domestic energy efficiency policy. While the analyses of hybrid coalitions and intermediary NGEs in the previous chapter show that the state has passed many of its functions on to other agencies, the national government institutions continue to act as strategic network managers through their ability to structure interaction of agencies. As this and the previous chapters have suggested, however, this ability is limited by the interaction with a heterogeneous mix of organisations, technical obstacles and economic flows.

Employing the post-Foucauldian, materially attuned perspective developed in Chapter Two to analyse the roles of policy makers and regulators suggests that their roles are principally to integrate competing interests through the creation of practically and politically viable systems of structured interaction. Because the resulting policies which perform this work of structuring interaction are the result of finding ways to respond to several discourse coalitions it is an inevitably political process, as Wolin observed in 1961: “political decision making is rendered difficult because of its having to deal with conflicting legitimate claims.” (Wolin, 1961) The data presented suggest that policy making is a process involving many different actors, many of whom direct their attempts at bringing about certain socio-techno-economic arrangements at the national government.

As discussed above, Hajer (1993) theorises networks of actors and actants which apply pressure, directly or otherwise, to the policy process as discourse coalitions and emphasises the linguistic, normative and epistemic common ground shared by collections of actors and the materials which they mobilise. This perspective is particularly helpful when thinking about how various actors and agencies, knowledges and framings of fuel poverty and climate change have developed but it provides only a limited account of the actancy and capacities of the extra-discursive aspects of policy making processes. However, the chapter has argued above that the discourse coalitions thesis, in which coalitions are "the ensemble of a set of story lines, the actors that utters these story lines and the practices that conform to these story lines, all organised around a discourse", (Hajer, 1993, p47), can be augmented in three ways. Firstly by focussing on the practices of coalition building and arguing that they are at least as powerful in effecting outcomes as the narratives often argued to hold coalitions together; secondly by analysing how they overlap with one another and share socio-techno-economic networks; and thirdly by placing more emphasis on the technical and economic aspects of discourse coalitions. Building on Hajer's argument in these ways the analyses conducted here suggest that the networks applying pressure on policy makers are heterogeneous arrangements of people, ideas, economies and things strategically engaged in bringing about particular policy outcomes. These are active in trying to structure future socio-techno-economic conditions around particular sets of principles and values but importantly, their recognition of the power of the national government, and certain key partners', roles as network managers leads them to channel their efforts around these centrally important actors. The state at the centre of these efforts to influence future socio-techno-economic energy efficiency arrangements is now scrutinised.

6.4.2 The Centrifugal State

Pierre and Peters (2000) usefully suggest, and Pierre alone is explicit in 2000 (Pierre, 2000a), in arguing that there has been a relaxation of regulatory steering and an increase in forms of public-private partnerships, which is described a 'shift from a centripetal to centrifugal model of governing.' (Pierre, 2000, p242) The analyses in this and previous chapters of the use of intermediaries to collaboratively develop and implement energy efficiency policies suggest that such a shift has taken place in the energy efficiency sector in the UK. In this centrifugal model, the state "seeks to increase its points of contact with its external environment as *a means of conveying its objectives* to the surrounding society." (Pierre, 2000, p242, emphasis added). From this perspective the state retains power but exerts it through different governmental practices, in particular by enrolling partners in particularly structured arrangements. This view of a central state action through intermediaries is not incompatible with a state which engages in consultation and is subject to pressures applied by discourse coalitions. The state institutions are engaged in consultation over the design of policies, and they do feel pressure from various actors, story lines and technologies. The data presented in this chapter testifies to this. However, the data also shows that it is part of the role of policy makers to 'be stretched', to 'find the right balance' and that the pressure from discourse coalitions is 'helpful' (from interviews with government department representatives) in drawing up policies which have can work. This process of interfacing with non-state actors to develop adequate policy responses is iterative, but at certain moments policies become frozen; they are written down and made 'loud, long and legal' (interview with government department representative). They have a

defined spatially and temporally limited jurisdiction and within it go on to create new arrangements and relations between economic and governmental, local and national, human and non-human actors.

The image of a centrifugal state with dispersed partners and technologies 'conveying its objectives' fits the data well, and is useful in explaining how and why the government departments have almost without exception employed a variety of non-state actors to implement, refine and coordinate fuel poverty and domestic carbon dioxide emission reductions policies. So while the centrifugal state employs a distributed network of other agencies it does so, in most cases, on terms set by government institutions and uses other agencies as combination and alignment devices, as discussed in the previous chapter. Through this process responsibility and accountability is centrifugally transferred through contractual arrangements to the various organisations managing programmes or, in the case of the EEC, the large energy suppliers who then effectively subcontract these responsibilities to NGEs in local area implementation settings. Importantly, by setting out the 'rules of the game' (Swyngedouw, 2005) in White Paper targets, such as those of the 2003 Energy White Paper in particular, the state creates a policy framework which formalises responsibility for the actualisation of governmental diagrams of low carbon, low cost domestic energy. Through this mechanism, while responsibility is centrifugally distributed, the state institutions retain responsibility for managing them. So viewing the state as a calculative central actor, albeit a flawed one, remains a sensible way to think about its ability to structure the possible practices of other national and sub-national actors, as well as its ability to curtail their potential activities. However, this

policy process is not free of politics. The political economy that Swyngedouw argues shapes consultative policy processes was a notable feature in the analysis of interview data and of policy documents, consultation responses and policy outcomes and is analysed in the following section.

6.4.3 Key Operational Partners

This extended quotation offers a powerful insight into the mechanics of professional energy policy consultation. It demonstrates the danger of highly deliberative policy making when those with who the state is in dialogue are hugely powerful businesses.

"Government Contractor, JC: The heavy utility lobby is of course that there are not enough priority group clients to treat. It is absolute bollocks. It is a prime example of hoodwink your regulator. There is an excellent article which I would refer you to... The argument is the regulator is not efficient because they (energy retailers lobby) put a very good argument together saying the world looks like 'this' and that the regulator sort of agrees with that and immediately it is set in place for the five years but the world changes, surprisingly, such that premiums of 30% regularly paid on the share price of utilities. Why? The only explanation is that shareholders have factored in the fact that the regulator is so inefficient that they will get a 30% - better than could otherwise be predicted return on this sort of stock, which is what I call the hoodwink effect. I think exactly the same philosophy applies in setting the (EEC/CERT) targets. This is (energy retailers') second or third biggest cost line and therefore has a big impact on the bottom line so of course they are going to talk up the price, talk about

how difficult it is to hit this, establish a set of criteria which gives them the maximum energy efficiency benefit from a minimum spend and then change is such that they spend far less than they thought they would, because that is factored into the whole competitive market pricing system and the difference is efficiency gained. That is common ground for all the utilities, and it's difficult to break through that because there is not sufficient information to argue. Oddly, they are the holders of all the information on this so unless you really get into it you can't disprove some of the things that they say until after the event, and actually history tells you a lot here because these arguments have been trotted out. This is the fourth time: 'These are impossible targets, we can't hit them at that price, these are even harder than last time'. You know what? They hit them earlier and cheaper every time. When you look at expectation against output they made bigger savings each time they've done it in these three year rounds. So like, haway regulator, come on, surely you've worked out by now what the game is? But apparently not."

The quotation presents a powerful narrative about some actors, namely the energy retailers, EAGA, and the Warm Front managing agent, that are in a different position to the other intermediary NGEs working to combine and align policies. Firstly, there is a knowledge gap between the government and the energy retailers. The regulator, OFGEM, and in turn the government, is at a disadvantage in terms of the knowledge available when making policy reform decisions, while the businesses in question, large energy retailers, are actively creating a knowledge based power differential. In so doing this special class of policy actor is able to do more than draw up a menu of policy options.

Secondly, these organisations are heavily involved in policy making due to the mutual acceptance that they will also be relied upon to implement and manage the policies. This dual role of consultant and implementer makes these key operational partners of government, as well as a source of pressure. What this amounts to is a situation in which energy policy is heavily influenced by large multi-national corporations who have the financial resources and professional experience to influence policy more effectively than smaller, less operationally critical organizations. The result is a bias in policy outcomes toward these large incumbents, which Mitchell also argues is happening in UK energy efficiency governance (Mitchell, 2008), which means that the kinds of patterns to emerge from markets designed and implemented in this way will be more likely to favour their co-originators.

In contrast, organisations which are not key operational partners are less effective in influencing policy design and instead have to try to actualise their diagrams of future energy arrangements through the national state institutions or its key operational partners. That organisations involved in influencing policy address the state institutions and the key operational partners first and foremost is evidence that they still recognise the continuing power of the state to determine the "rules of the game". Furthermore, it also supports the argument made by Swyngedouw (2006) that the national governmental diagrams are forced to comply with what Hajer might call the "narratives" of large, commercially organised actors who have, over the course of energy liberalization in the UK since the mid 1980s, become operationally critical and as such have a degree of influence over policy that is not shared by other types of

pressure group. It amounts to an elite tier in consultation processes who can affect policy very directly due the two factors identified above; firstly by virtue of being operationally active for the last 20 years while the government has not been they can claim to have specialist, firsthand knowledge about out what 'the world out there' looks like, what its problems are and how they can realistically be tackled, and secondly, they are critical to any realistic plan for implementation so cannot be jettisoned. This finding is supported by Ruostetsaari's study of energy policy making in Finland where it was also found that large incumbent energy businesses enjoyed greater access to policy makers and greater control over outcomes than other non-nation state agencies. (Ruostetsaari, 2008)

Thus the centrifugal state and its key operational partners are targets for other actors involved in energy efficiency governance and are encouraged to integrate policy pressures into policies which are inevitably the hybrid outcomes of these competing pressures, however these hybrids are more influenced by the key operational partners than other actors. This process leads to policy outcomes which are market based and which structure relations in ways which are often synergistic commercial requirements of key operational partners as well as the requirements of government's diagrams of the future energy economy.

6.4.4 "Funny Markets" and their Outcomes

The above discussions suggest that through this mode of governance, state institutions and the agencies through whom they govern create outcomes which tend to be based

around market based interaction. Taken together the arguments above suggest that the state is operating centrifugally via the reconfiguration of governmental power rather than by shrinking or passing of power to intermediaries, as Swyngedouw argues is a common feature of contemporary governance:

"It is argued that this shift from 'government' to 'governance' is associated with the consolidation of new technologies of government, ... (These) socially innovative arrangements of governance-beyond-the-state are fundamentally Janus-faced, particularly under conditions in which the democratic character of the political sphere is increasingly eroded by the encroaching imposition of market forces that set the 'rules of the game.'" (Swyngedouw, 2005, p1991)

Swyngedouw here not only argues that the state has reconfigured the ways in which it operates but that this process is to a great extent influenced by key operational partners able to determine what he refers to as "rules of the game". In the data below the market is invoked as a source of agency that would be vital to the successful achievement of governmental objectives, and to the actors and actants that energy markets could enrol into its service. The argument that market based logics have been woven into the heart of governmental decision making around energy efficiency is explicitly found in the data here from one of the government's most senior energy efficiency policy makers.

"GP: How do you engage with energy retailers around fuel poverty?

DTI, PR: We do encourage companies to think innovatively about their most vulnerable customers, and sometimes they do so with something like the winter mail out. We will facilitate or make sure that someone facilitates it so something happens. So we've had the winter mail out and had consumer events about switching supplier, and making the market work. ... So these are all activities where, as the department or as fuel poverty officials, we have worked with suppliers to get a mutually beneficial outcome."

This answer to a question about how government works with energy supplier implies that governmental engagement with the energy suppliers has to be on their terms. It supports the argument that the government is in a mutually dependent relationship with large, commercial key operational partners and as a result it is difficult for it to be seen to act responsibly in any way other than through market logic as illustrated in these interview excerpts:

"GP: Is protecting the freedom of the market entirely entrenched in all of this or is there any capacity for...

DTI, PM: Well it is the role of the regulator OFGEM to ensure that the market operates in a competitive manner - government tends to leave that some arms' length. So really, I think, competitively we'd say that we'd leave that to OFGEM. Where we have more of an interest is in protecting the consumer."

“DTI, KR: I suppose if you were thinking about pure market economics, would a pure, free-market look like our EEC/CERT market at the moment? Possibly not in terms of some of the interventions in terms of would there be a carbon market that had social responsibility angles? So I think that competitive markets are a key White Paper target., I wouldn’t say entrenched, but we've nurtured a competitive market in many ways so that as well as being competitive it will deliver your objectives.”

“GP: One of the things that I was going to ask you to talk about more in that once you've set up it’s quite a hands-off way of doing things.

DTI, PR: The government very much believes that the market is the best way to drive forward carbon abatement in all sectors. and though the government has a role to play, and our role might be things like encouraging things, smoothing things, you know or providing promotion for things, or it is sometimes providing a carrot and the EEC/CERT is a carrot and a stick on energy suppliers saying, ‘You have to do this. You have no choice,’ but we just set the broad parameters and then leave them to use the market to find the best way to deliver it.”

“GP: (On a proposed modification to the EEC) That sounds like a really interesting solution, but again, you are creating space to allow the actors to get on and do the work and find the best way to do that.

DTI, JH: Yes. One thing that we have been very careful to say is that there is not one single way....We set a framework and set the ability for things to happen. We’ll try not to be restricted in how we do things. We’re not trying to say is you have to follow

route a, b, c to get there. Work what's best for you in your organisations. Both the same overall aims at the end of it."

Here, even where government department respondents do not see the government as regulating the market directly they cite OFGEM and its role as a market enforcer tasked with preserving market principles and they construct individuals as consumers. In this landscape, the programme managers interviewed felt it was crucial to allow key operational partners the flexibility to implement policies in ways which suited them, rather, to find ways to align governmental responsibilities with commercial imperatives. While retailers felt they were being enrolled into doing governmental work - as evidenced by one programme manager's comment, "It's the job of government... We can't be expected to solve fuel poverty for them but increasingly that's the case" (Interview with energy retail programme manager) - and EAGA's phenomenal success is built on the value of its government contracts, this and other interview data used above suggest that government is required to adopt a commercial posture when dealing with these key operational partners. So while the centrifugal state metaphor of Pierre is very helpful in describing the relationship intermediary NGEs and NGOs have with the national state, the relationship between the state and key operational partners is characterised by a higher degree of mutual technical and economic dependence. The result of this mutual dependence is that policies are designed to allow market forces to structure outcomes. This way NGEs can perform their alignment and combination work in localities and regions, while the key

operational partners are able to shape the policies sufficiently that they do not significantly challenge the economic status quo.

"GP: You mentioned that you are running out of cavity walls to fill. In looking at EEC/CERT three, is that why micro-generation is going to be a bigger feature of EEC/CERT three?

DTI, PM: Well, it's for a number of reasons. Firstly we want to give suppliers greater flexibility in how they can deliver the EEC/CERT targets so for the first time in this next generation of EEC/CERT we are proposing that all forms of micro-generation be creditable. …. So we want to give suppliers more flexibility, number one."

GP: Why is flexibility such a priority? What is the value in flexibility?

DTI, IR: Flexibility is important if we want to keep costs down. We could ... be incredibly prescriptive, but what you do then is you limit their room for manoeuvre, you dull their incentive to go out and look for the best and most cost effective blend of measures. So we want to keep costs down because we know that ultimately suppliers have the power to pass on the costs to consumers through energy bills, and we want to minimise the cost passed through."

These quotations are selected to highlight policy makers' adoption of some of the assumptions of neo-classical economic theory. Flexibility and freedom is assumed by policy makers to be necessary for the successful implementation of projects. As a

result the government acts to structure the economic spaces in which energy efficiency markets can be performed but avoids entering into the market wherever possible. The market is invoked as a way to structure interaction which, through its own logic of incentive, can generate productivity, innovation, and the achievement of goals in ways the policy makers themselves cannot. This relationship between state and market, in which the state acts a facilitator of energy markets, has a long and deep rooted history in the post-Fordist era as this quotation from 1982 demonstrates:

"I do *not* see the government's task as being to plan the future shape of energy production and consumption…Our task is rather to set a framework which will ensure that the market operates in the energy sector with a minimum of distortion and energy is produced and consumed efficiently." (Lawson, 1982, in Helm, 2003)

The continuing priority attached to economic growth and of solving problems through market based opportunities can be seen in this interview excerpt:

"DTI, PR: I fundamentally believe that there is consensus that it (domestic energy efficiency) is a problem and a problem that needs to be tackled in a cost-effective manner that has benefit to the UK. I mean we're not going to destroy the economy so it's a matter of looking at the opportunities that are presented." (Interview with Government Department Representative)

These discussions of market based policy programmes present the energy efficiency economy as something which must be structured and facilitated by the state, and reveals the political economy at the heart of energy efficiency governance. It suggests that while the policy outcomes can be influenced by discourse coalitions, the range and extent of possible policy programmes is framed by a commitment to market based policy measures, a commitment which can be traced back to a speech entitled 'The Market for Energy' given by Nigel Lawson, the Conservative Energy Secretary in 1982, and the subsequent Oil and Gas Enterprise Act of 1982. Helm argues (Helm, 2003) that this was a pivotal moment in British energy policy and continues to shape policy decision making to such an extent that alternatives to the market are tolerated only if they lead to economically beneficial modifications to other market spaces. Crucially, however, when discussing vulnerability the quotations above describe the government's role creating particularly weighted market spaces, what one participant called "funny markets", calibrated to function in a more equitable way than a 'pure' market, rather than through other non-market means of intervention.

6.5 Conclusions

Domestic energy efficiency policy in the UK is structured by policy goals which attempt to transform energy networks around governmental diagrams of low carbon, low cost energy futures. The actualisation of these diagrams reconfigures the interaction of social, economic and technical aspects of energy networks in which consumers, suppliers, technologies, buildings and governments co-operate in the

production of particularly calibrated energy socio-techno-economic arrangements. The chapter offers three key findings which contribute to other research in the field.

The first of these is that through these processes hard to treat and hard to reach homes are marginalised and find it difficult to achieve the cultural, financial and technical entanglements that are required to engage with the programmes. It is argued that by prioritising flexibility in the centrifugal mode of governing the government accepts that problematic overflows must be tolerated. Indeed they are the inevitable, albeit temporary, effects of policies being reconfigured by the unruly socio-techno-economic geographies of the emerging low energy economies, which take their intended linearity into multiple new directions through their generative, productive capacities and connections which are not restricted to governmental diagrams. This point raises a question about how the centrifugal mode of governing structures state-society-economy relations. Whether governing centrifugally makes state institutions too distant, too relationally remote from the everyday lives of energy users and the issues they face is a question that future research might address as it is certainly the case that problematic outcomes do stem from the alignments, combinations and compromises that the centrifugal governance of energy efficiency precipitates.

Secondly, the creation of these policies has been shown to be a highly strategic process. In order to create coherent policies, state institutions must choose from a menu of options which is, to a great extent, determined by hybrid discourse coalitions. It is also observed that in order to be effective in influencing policy, coalitions must also strategically construct internally coherent narratives which hope to structure

governmental diagrams. An important related point comes from scrutinising this process; the chapter suggests that an elite group of key operational partners are able to influence policy design more powerfully than others as a result of their status as key operational partners.

The third contribution offered by the chapter is that the analysis of the EEC / CERT also provides an insight into the potential of what markets might be (Smith, 2005). The EEC/CERT operates as a powerful system derived from market principles and described by policy makers in market terms but it is clearly not restricted by conceptions of the 'perfect market'. The way that 'distortions' and 'inefficiencies' are factored into the EEC/CERT markets and how it performs functions other than those which neoclassical economic wisdom suggests a market ought to do is central to the understanding of what the EEC/CERT is and, crucially, the political potential of what the EEC/CERT might do beyond 2011 for fuel poverty and climate change. EEC/CERT has delivered carbon dioxide reduction and fuel poverty alleviation, surpassing the targets of each regulatory round, but it has *not* on its own reduced UK carbon dioxide emissions or fuel poverty levels to the extent demanded by the government's legal targets. Within it is the promise of a different kind of market; one that state institutions are active in shaping and one whose design is less about purity of markets and more about what socio-techno-economic relations, correctly configured, can perform for society and the environment. The EEC/CERT has shown that it is possible to structure a market in order that its outcomes will be more 'like this' and 'less like that', but that in doing so it is always the case that there will be outcomes

which are neither, which surprise and frustrate designers by producing overflows as that which was repressed returns reconfigured.

Chapter Seven discusses the potential of such “funny markets”, as one government department representative called them, to actualise various governmental diagrams, drawing on the lessons learned from the EEC/CERT. It also draws together the key findings that have emerged from the journey taken from domestic practices, through local area initiatives to implement, combine and align policies through to the national policy arena analysed above.

Chapter Seven: Conclusion

7.1 Introduction

Domestic energy use is key to understanding and responding to the threat of climate change. It also has a central role to play in households' welfare, wellbeing and ability to cope with the economic challenges of everyday life. Due to the way that the cost of a warm home and the carbon dioxide emissions generated by domestic energy use are interconnected through the technologies and markets of energy networks they are difficult to disentangle – both analytically and politically.

The first section of this concluding chapter consolidates the key arguments and findings from the preceding chapters, and responds directly to the research questions set out in Chapter One. This section of the chapter is structured around three headings which divide the conclusions into three parts dealing with the governance framework, synergies and tensions between climate change and fuel poverty, and everyday practice. Following this there is a discussion of the strengths and weaknesses of the study and the approach taken to the research. The key contributions made by the thesis to theory and practice are summarised before the thesis concludes with a consideration of its implications for future research both in the energy field in particular and for the future studies of governance arrangements and practices.

7.2 Key Findings: Everyday Energy Use

Research Question 1: How are practices of energy conservation undertaken in households? How, and with what effect, do current policies shape attempts by householders to enhance their energy efficiency?

7.2.1 Engagement with Energy Networks Outside the Home

Engagements between householders and other agents in the energy sector were a key part of the study of everyday energy use. It is suggested in Chapter Four that relationships of this kind were strongest when they are techno-economic as well as rather than exclusively discursive-governmental. Participants tended to relate to the wider energy sector through niche governmental entrepreneurs who partially structured their energy use practices by either selling them energy technologies, helping them access the funding tied up in the national policy programmes or who could give them advice about the kinds of tough economic decisions they are faced with when trying to either (or sometimes both) reduce their carbon dioxide emissions and reduce their vulnerability to fuel poverty. These agencies were found to be playing an economic-governmental role by providing this advice, and being recognised as more reliable providers of locally attuned, context specific advice about which techno-economic solutions might work for each household than national energy companies or local governments.

As well as this engagement through commercial and quasi-commercial intermediaries Chapter Four also suggests that there was a noticeable disengagement from national government and other supposedly trustworthy institutions. Institutional distrust was

common, as found by Bickerstaff and Walker (2003), and Poortinga et al.(2004). Where individuals did agree with messages about energy conservation coming from the government it was most often reported that these messages reinforced previously held views and values about respect for the environment, respect for things in themselves, and waste aversion rather than that they were creating new ways of using resources.

7.2.2 Resonance Between Governmental and Domestic Projects.

The political potential of resonance between governmental projects and already established domestic practices is a second key finding from the householder research. It was found that decision making of the kind usually associated with a rational actor of classical economics and utilitarian thought did not adequately explain energy use behaviour. Rather, practice was found to be a hybrid socio-techno-economic entity; the outcome of the relationships between people, their core values and knowledge, their economic situation and the material things with which they are co-present - human and non-human. As practices are achieved in such a collaborative way, they cannot be considered to be the result of reasoning alone, and as such the thesis supports the criticism of the information deficit approach (Burgess, 1998; Shove 2003; Shove 2007) to changing energy use practices. Rather it is argued that changes in practices result from interactions between new socio-techno-economic governmental projects and the many different pre-existing energy arrangements already present in homes across the UK.

The research uncovered that two particularly powerful pre-existing narratives had built up around previous discourses, materials and economies; waste aversion and comfort which resonate with the findings of Shove (2003). Taking waste aversion first, where new energy efficiency projects were able to integrate and resonate with practices structured by these narratives and specific domestic arrangements, as was often the case with waste aversion where they often seemed to 'plug into' one another, the results were that the governmental diagram of energy efficiency became embedded in practices relatively well, with many people reporting that they were now doing more of what they knew they should be doing anyway. For those who reported plugging policy messages into their waste aversion practices in this way there was a tendency to talk about the technologies as enabling, and being worthy of care and respect due to the things they enabled the participants to do, such as keep the family warm, or reducing their bills. In contrast, for some houses technologies were thought to be restricting the household's ability to cope financially.

Building on these insights the thesis argues that technologies are involved in structuring the way practices and objectives are aligned and therefore important objects and subjects of government. As well as being a part of how governing and domestic patterns interact in practice, the actancy of technical and economic components of energy networks is a feature of the ways in which power is transmitted over space, into and out of the homes, businesses and governing agencies, as Section Four discusses.

7.2.3 Comfort at Socio-Techno-Economic Entity

Chapter Four also argues that people prioritise comfort and that this has several consequences for them. Many of the people who took part in the study have to seriously modify their lifestyle when it gets cold. This is because thermal comfort must be achieved by working with and within the technical and economic framework of the home. Because of this, Chapter Four argues that quality of life was found to deteriorate in winter, with various sacrifices made in order to prioritise comfort.

Responding directly to Research Question 1, the two major features of energy use practice discussed above, waste aversion and comfort, were found to be present in both fuel rich and fuel poor households. What did vary between participants with a range of incomes was their level of dependency on other actors. The households most vulnerable to fuel poverty were likely to be dependent on a local energy agency, or more likely a social landlord, to assist them in getting access to new technology and energy advice both in terms of technical competence and financial support. In contrast, a common theme in fuel rich homes was energy independence. Distrust in government and having the financial resources to invest in upgrades to their homes coupled with the capacity to interpret and navigate markets confidently made contact with governments almost non-existent. Furthermore, contact with energy businesses was seen as a mutually beneficial trade, rather than the provision of support and guidance. For these households the work of NGEs was less important as they were often not eligible for or not interested in the policy programmes. An important rationale for this was to establish relationships on equal terms with other energy actors instead of a

governor-subject relationship often found to be less directly challenged in lower income households.

As discussed above governmental technologies of many kinds structure the opportunities which are presented to individuals. In recognition of this governing agencies used purchase points, precipitated by the life cycles of goods like gas boilers, and terms of services like the short length (30 days) of fuel supply contracts in the energy retail market, to alter the frame of the possible. In doing so they attempted to curtail certain energy use practices and make others increasingly likely by altering the technical and economic components of practice. That this process can only be one of making certain doings more likely or more possible rather than scripting them with certainty is crucial. Chapter Four found that attempts to realise governmental diagrams are imprecise and that any one such project will be unravelled to a greater or lesser extent as a result of its relationship with others. Socio-techno-economic diagrams which overlap can include housing markets, energy tariffs, technical household energy properties as well as working patterns, leisure habits and all the other frames upon which everyday life hangs. The practices that are produced by the interactions between governmental energy efficiency projects at purchase points are difficult to discipline because no single project can exhaust all the capacities of the heterogeneous things, humans and non-humans, that it shares with others. The hybrid practices that result exceed attempts to discipline them, most problematically when technical, social and economic conditions are at odds with the optimum state of interaction imagined by those attempting to structure energy use.

7.3 Synergies and Tensions Between Climate Change and Fuel Poverty Objectives

7.3.1 Policy Interaction

Research Question 2: What attempts to better coordinate domestic energy efficiency policies and interventions have taken place at the sub-national level, and to what effect?

Despite their discreet objectives the major national policies interact as a result of their material and economic interdependence. The EEC / CERT is designed to improve energy efficiency with the aim of reducing carbon dioxide emissions rather than alleviating fuel poverty while the Warm Front programme is specifically targeted at fuel poverty rather carbon dioxide emissions, and the Decent Homes Standards are designed to improve the housing standards of those in social rented accommodation rather than address either carbon dioxide emissions or fuel poverty directly. They are separate projects which try to structure energy networks around discreet objectives but overlap with one another because they all connect with common materialities and because they all must achieve their aims by the re-channelling of economic flows so that connections between these things are reconfigured. In many ways these overlapping socio-techno-economic projects are synergistic and the policies' aims are mutually achieved. Evidence of this can be found in the *UK Fuel Poverty Strategy Annual Progress Reports* (BERR, 2008) and the *Annual Reports on Progress Towards the* 2003 *Energy White Paper 'Our Carbon Future – Creating a Low Carbon Economy* (BERR, 2008). For example the EEC / CERT, by the end of its operating period in 2011, has the potential to lift over 100,000 households out of fuel poverty (BERR,

2008, p19). In the context of explosive energy price inflation, however, the figure is very likely to be significantly reduced. Warm Front and other fuel poverty measures, when taken together, are the UK's third most effective carbon dioxide reduction strategy, after EEC / CERT and the building regulations changes, reducing carbon dioxide emissions by 0.4MT by 2010 (DEFRA, 2006). These positive overlaps illustrate the potential that exists to tackle fuel poverty and carbon dioxide emissions in a joined up way. There have, however, been tensions between the programmes and the wider objectives of the Energy White Papers of 2003 and 2007 as they have been implemented as discussed below.

7.3.2 Barriers to Integration

Research Question 3: What are the barriers to the integration of attempts to tackle climate change and fuel poverty?

Barriers to better integration of the policies were found to have techno-economic and institutional characteristics.

Techno-Economic Barriers: Chapter Six argues that the market based, centrifugal mode governing results in a technology bias which leads to the low hanging fruit, that is the energy efficiency measures which give the best carbon savings per pound sterling, being preferred over other technologies which are either more expensive or which require calculations of returns on investment to have longer time scales. The result of this is that implementation activities interact with local and domestic level

scenarios in such a way that those who live in homes which are on the gas mains, which have empty wall cavities and lofts, can engage with the policies, and those in off-gas areas, or with solid walls struggle to. Because the providers and NGEs are reluctant to fund the more costly measures needed in these 'hard to treat' homes, householders in these situations continue to pay for the programmes through their energy bills in the same way that everyone else does, but they will be prevented from benefitting from them. The effect of this process is that clusters of local areas experience the policies in very different ways to other areas, creating a varied landscape of policy synergy and tension. The ways in which certain technologies are deployed and house-types benefit while others do not may seem to be technical barriers but they are created by the structuring effects of economic rules written into market based policies which determine the kinds of relationships that can emerge between technologies, homes, users and businesses.

Chapter Six also argues that other techno-economic tensions surround the costs of the carbon reduction measures. By doubling the size of CERT but reducing the proportion of money to be spent on the Priority Group there will now be a greater cost for all households, but a smaller percentage of low income families will benefit, particularly those in hard to treat homes or who are hard to reach. The Flexibility Option written into CERT is an example of the government trying to encourage NGEs to make a wider range of technical solutions economically viable within the market based CERT environment but it is a relatively small part of a much larger shift to reducing carbon dioxide as inexpensively as possible. The primary barrier to better integration of a wide range of low and zero carbon technologies however is the commercial logic

which creates the opportunities that can be taken by actors seeking to implement the policies in a joined up way. This can be seen in the way that Warm Zones Ltd, the most prominent example of an NGE, have succeeded in implementing the major programmes in a coordinated fashion but have failed to overcome the least cost logic built into the programmes which still shapes the kinds of socio-techno-economic outcomes that coordination agencies are able to create. The result, as described in Chapter Five, is that in many areas NGEs are now experiencing a saturation phase in which the existing opportunity structure has been fully exploited, but this has resulted in only modest carbon dioxide emissions reductions and has not eradicated fuel poverty.

Institutional Barriers: Chapter Five argues that two phases of policy coordination managed by local NGEs have unfolded in the areas studied but that in some areas a new and as yet poorly defined third phase is required while other areas are not yet in phase one. This state of geographic or territorial inequality of implementation is also, in some areas, reflective of differences in local governmental action on energy efficiency, which in some cases constitutes an institutional barrier to integration. If the local authority lacks the political commitment, resources or expertise to coordinate energy efficiency work and if there is no local coordination agency prepared to exploit that policy niche, the locality will be left in a 'governance gap'. While this was not found to be the case in any of the three areas studied in this project, it certainly was found elsewhere through the participant observation research carried out at conferences and networking forums as well as policy document analysis.

7.4 The Governance Framework

7.4.1 Responsibility

Research Question 4: Who is responsible for domestic energy conservation, over whom, to what purpose and with what effect?

The thesis has argued that responsibility for coordinating fuel poverty and climate change policies has been contractually passed to a range of NGEs who must coordinate and find locally attuned, effective ways of meeting the targets written into the national government's policy programmes. This process in conceptualised in Chapter Five as one of aligning the needs of the various actors involved in domestic energy use and governance and seizing commercial opportunities to combine the programmes effectively.

Chapter Six argues that the core national energy efficiency programmes, EEC / CERT, Warm Front and the Decent Home Standards, all actively distribute responsibility to non-nation state actors to find cost effective ways of achieving governmental energy objectives. To take them in turn, EEC / CERT requires national energy retailers to meet carbon reduction targets so responsibility to reduce carbon dioxide emissions is contractually passed from the government and its institutions to energy retailers. In this scenario governmental responsibility to achieve emission targets is distributed centrifugally to its partners. The Decent Homes Standards require local authorities and registered social landlords to upgrade their stock of dwellings to the minimum standards defined by central government. Again, the centrifugal nation state devolves

responsibility to local state institutions and social landlords for the work on improving the thermal performance of properties which will be home to many low income households, thus going some way to protecting them from fuel poverty and as a by-product of the improved SAP rating, reducing carbon dioxide emissions from the social rented sector. Thirdly, the Warm Front programme requires a contractually appointed managing agent to be responsible for allocating a targeted amount of funding to eligible households, and it is the managing agent's responsibility to see that this money is spent and that the tax payer gets value for money.

Taken together these analyses demonstrate that responsibility is created by national government in their White Papers and legislation, but it is then deliberately passed from the national state institutions to the above mentioned non-nation state actors through contractual arrangements or legislative requirements. In this way the state can be said to be acting with centrifugal force (Pierre, 2000). For the actors to whom responsibility is passed it comes to be thought of as responsibility to implement the policy programmes. Simultaneously effectively aligning and combining the policies while failing to make successful progress toward carbon dioxide emissions targets and the acceptance that the 2010 fuel poverty targets will not be hit suggest a problem with this market structured centrifugal mode of governing. It suggests the framework which both structures and precipitates the achievement of those responsibilities is not creating the right cultural, technical and economic relations. The arrangements being created are internally coherent and coordinated but their designs are not yet adequately bringing about the kinds of interactions required to meet the government's fuel poverty and climate change objectives. This is the result of the powerful ways in which socio-

techno-economic factors outside of national government institutions structure the relationships between policy programmes and actors in energy networks. That some technologies, some economic factors and some discourses structure practices more effectively than others results in the social and geographic inequality of outcomes described in Chapters Four, Five and Six.

7.4.2 Coordination

Research Question 2: What attempts to better coordinate domestic energy efficiency policies and interventions have taken place at the sub-national level, and to what effect?

As argued in the first response to Research Question 2 above, responsibility to coordinate and implement the national policy programmes is passed to non-nation state actors. The NGEs studied in this research were able to operate due to the way the governance framework is configured. They exploit local policy niches that emerge as a result of the gearing effect presented by the co-presence of EEC/CERT and the Decent Homes Standards. Because local social landlords have a responsibility to upgrade their properties and energy retailers have a responsibility to install technologies which will reduce carbon dioxide emissions, there is the potential for them to cooperate so that each contributes financially to the same installation work and each gets to reach its own, separate target at more or less half the price of not cooperating with one another (depending on the deal brokered). Because this potential is created by the overlaying of the two policies, with each trying to create separate but materially interdependent

outcomes, a policy niche emerges in which an organisation who can facilitate this interaction, provide stewardship for each party and, in many cases, can actually perform the coordination work will be rewarded for doing so, hence the emergence of local area based niche governance entrepreneurs.

Between CERT and Warm Front, coordination is based on mutual referrals, or leads, exchanged between the niche agencies described above and the single managing agent for Warm Front. The commercial nature of this coordination becomes yet more complicated as the managing agent, EAGA, also owns several other energy efficiency businesses, so it effectively refers work between the companies who make up the EAGA Group PLC, or the different wings of its central EAGA business. Referrals into Warm Front / EAGA were found to be very common as the local niche agencies are unable to access that funding, but EAGA were felt by almost all participants to be far less likely to refer work out to the niche agencies because it can be done, very effectively, in house.

In summary then, coordination is achieved commercially, by taking the commercial opportunities written into the national policy programmes. From this perspective, coordination is achieved by the channelling of market forces along particular paths by policy makers and by framing techno-economic conditions of possibility. This kind of political and technical structuring of energy efficiency economies is central to how practices are structured and to how they might be structured by future attempts to calibrate socio-techno-economic networks.

7.4.3 Sites and Technologies

Research Question 5: *Where and what are the sites of governance and what governmental technologies are employed?*

The thesis has argued that government operates through networks of ideas, economic flows and technical systems in an attempt to structure and manage energy purchase, use and waste. Technical devices and systems as well as discursive technologies are used to both transport governmental diagrams over space and to actually structure the possibilities of practice in various spaces of policy work and energy use. However, two critical nodal points in these networks are identified in the thesis. Firstly Chapter five focuses on the local policy niches where otherwise disconnected energy, housing, benefits, health and carbon reduction policies overlap and interact with one another. The geographic differences between the area studies and the observed differences between other areas in the north of England illustrate the powerful consequences radiating out from these niches in overcoming or succumbing to the technical, economic and institutional barriers to policy implementation discussed above.

Secondly, through a discussion of national policy processes, Chapter Six identifies the consultation process as being a key moment in the governance process and argues that key operational partners use their operational knowledge and capacity to influence policies in order that the policies that emerge do not significantly challenge the status quo, and in many ways favour the large incumbent actors. Through this process the EEC / CERT in particular has been shaped in such a way that suppliers reach their

targets every year but as a whole the policy, even when operated successfully, does not transform the socio-techno-economic relationships in the domestic energy market radically enough to bring about the low carbon, affordable energy reality envisioned in governmental diagrams and formal targets.

7.4.4 Opportunities

Research Question 6: What lessons can be drawn from the fuel poverty and climate change sectors, and how can policy interventions and household practices be enhanced to promote wellbeing, quality of life and greenhouse gas emissions reductions?

Overcoming these barriers to integration and the tensions between the objectives will require the generation of new ways to overlay, connect and arrange new governmental diagrams onto the already existing, spatially differentiated socio-techno-economic practices of energy consumption. Chapters Five and Six argue that these new patterns will need to bring about greater and more complete integration of a wider range of technologies in differently configured economic formations if carbon dioxide emissions and fuel poverty targets are to be met. Chapter Six also argues that the EEC/CERT has, through the Priority Group, shown that it is possible to calibrate a market to produce fairer outcomes. Building on this, markets should not be thought of as the more or less efficient, pure markets of neoclassical economics but as networks of economic, technical and cultural relationships which can to some degree be set up to perform various functions. It is also suggested however that in doing so it is always the case that there will be outcomes which surprise and frustrate policy and market

designers. The thesis draws on the work of Law and Mol (2002) to suggest that this is because of their inability to monopolise the capacities of the heterogeneous things with which they are engaged.

7.5 Reflecting on the Research Process

As with any research project, there are elements which worked very well and which strengthened the research while in others important lessons were learned about the research process. The key strengths of the project were felt to be in the links built up with other professionals both within and beyond the academy. By attending and in some cases organising conferences, workshops and other events, genuine links were established with other researchers in the field, leading to the development of a network of energy and governance scholars which became a valuable resource as the project developed. Beyond the academy however is where the project was able to reach furthest. By working hard at developing relationships with energy practitioners in the north of England I was able to gain valuable insights into the workings of local governance and as the project progressed these links became mutually beneficial as the research was strengthened by the access and insights gained while practitioners were able to use the findings, from the area studies in particular, to inform their own policy directions. To enable this I offered to speak at or facilitate various relevant events which, again, helped them and enabled me to get exceptionally useful feedback on the research while analysis and writing were underway.

These points stem from the project's innovative methodological and analytic approach. By deciding to follow the issues circling energy efficiency from the fireplaces and thermostats of everyday life, through myriad multi-scale intermediaries into central governmental departments and then observe how these various sites connect with one another strong networks have been developed. Furthermore, this approach has enabled the Thesis to contribute to theoretical and practical debates, as Sections 7.6 and 7.7 discuss.

Two further areas need to be discussed in this section, each of which had both positive and negative aspects; the role of the CASE partner and the methods used in the field work.

Firstly the CASE partner, NEA, was incredibly helpful in providing access to training, a specialist energy library and most importantly access to networks of energy professionals in localities and in the national policy arena. They also helped with dissemination and provided expert advice and specialist knowledge from their research team. These aspects of the CASE studentship were hugely important to the success of the project. On the other hand however, the CASE model presents challenges. One such tension is that because the NEA so heavily invested in a particular narrative about energy affordability, it made being critical of this perspective difficult as the organisation has such a strong political commitment to fuel poverty as a specific policy issue. This was managed by unravelling the history of how fuel poverty became discursively institutionalised, as in Chapter One, but reflecting on this it is felt that more could have been done to challenge NEA's perspective by foregrounding the

social construction and political utility of ‘fuel poverty’. Analysing the CASE studentship model further suggests that these tensions may stem from the lack of defined outcomes for the CASE partner. While the academic outcomes of the PhD are clear it was difficult to know exactly what the CASE partner expected from the project, and what their rationale was for being involved. While there are many possible rationales, and it is likely that they all combine to make the project interesting and valuable to the CASE partner, without clearly defined expectations it is difficult to know how to make the process work for them, and indeed whether this ought to be a concern of the research student. In practice, this was managed by establishing regular meetings and regular contact and providing opportunities to discuss the project and its anticipated outcomes. This resulted in a report for practitioners being written and a dissemination workshop being organised to make sure that the CASE partner and other stakeholders and participants had the opportunity to engage with the project findings.

Secondly, the field work methods only partially satisfied the conceptual aims of the project. Of course, conceptual development is an iterative process in which engagements with the field prompt researchers to revisit and reconsider how they conceptualise that which is encountered. Through this process progressively more focus was placed on the relationships between the social, economic and technical, but as the field work had to be planned, participants recruited and then visits conducted in good time to ensure the completion of the project, they were not able to be revisited after the analysis of the findings. This is not an unusual problem in qualitative projects trying to research previously neglected issues, but it is felt that the fieldwork conducted was unable to access the technical aspects of energy use as directly as

would now be desirable. The technical aspects of energy practices are only present in the data and therefore available for analysis indirectly in two ways. Firstly, they prompted participants to talk about their domestic energy use in the home visits when participants were asked to show rather than tell how they used energy but because this was recorded through the talking that went on around these moments of enactment the technical is only indirectly present in the analysis. Secondly, technologies were also indirectly present in the interviews with policy makers and business representatives by the way they shaped the possible ways in which diagrams of low carbon and low cost energy could be actualised. The challenge of more directly, more thoroughly integrating the social and the technical in qualitative research is one which the thesis hopes to have contributed to but it is acknowledged that future research which is more methodologically innovative and which is designed from the outset to study the technical is needed to develop this.

7.6 Contribution to Theory

The thesis makes three key theoretical contributions. Firstly the thesis has argued that in order to understand how energy efficiency is governed, by whom and with what effects it is necessary to take a socio-techno-economic approach. The governance debates discussed in Chapter Two, which attempt to analyse the steady 'erosion of traditional bases of political power' (Pierre, 2000, p1), and the related debates about the role of the state in the post-Fordist era tell us much about how, through discursive, epistemic and interpretive means societies and economies are structured in contemporary society. The thesis has argued however that despite the valuable insights offered by these traditions they have been integrated too infrequently with economic

geographies and studies of socio-technical systems. To summarise, by reconciling Foucauldian and ANT approaches, recognising that they are complementary ways of illuminating the practices involved in structuring society and economies through various technologies and techniques the thesis has widened the scope of studies of governance. This is achieved by including a more diverse range of phenomena and more complex causal mechanisms while demonstrating that ANT can be developed to contribute to the study of government.

In particular Chapter Five builds on the introduction of Lee's work on the Ordinary Economy (2006) in Chapter Two by suggesting that the economic facets of everyday life, the ordinariness of paying for fuel or getting into debt, create real economic spaces which leak into the socio-technical spaces of technology use, misuse, decay, maintenance and purchases. Taking this further the thesis traces the relationships between these hybrid everyday practices and the networks of practices and projects with which they interact. In doing so, rather than seeing household, local and national practices existing in different planes or scales, attempts to organise practices around certain optimum diagrams are seen to interact across scalar, socio-economic and socio-technical boundaries. They overlap, plug into one another and tessellate in some areas while in other areas they jar and create disconnected spaces and omissions. Governing is argued to be the work of creating the optimum states of interaction between these various socio-techno-economic phenomena. It is the process of calibrating the ways in which humans, ideas, technologies, markets, governments, businesses, homes, infrastructures, narratives and the environment are arranged; it is an *attempt* to structure their relationships.

From this perspective comes the second key theoretical contribution, the recognition of the effects of the simultaneous presence of several projects which attempt to structure a shared array of heterogeneous actors and actants. This enables not only an analysis of how particular groups of technologies and economic conditions are shared by a discursive storyline, as Hajer's discourse coalitions approach does (Hajer, 2003), but the effects that are created when socio-techno-economic networks are structured by several different projects originating in diagrams at different places and different scales. To illustrate this point, we can think of calls for individuals to reduce their carbon dioxide emissions as one project trying to structure practice, which attempts to marshal phenomena into a particular state of interaction. When this interacts with other structuring forces, such as the need for older people to stay warm in winter for health reasons, deeply held distrust of the state, unemployment and poorly designed incumbent technology, the experience for individuals and for governmental practitioners working with them is a highly complex kaleidoscope of interacting projects, which produce hybrid socio-techno-economic practices which are difficult to map, control or predict.

From this perspective the thesis builds on Hajer's discourse coalitions approach to governance in three ways: firstly by factoring in a greater account of the capacities of the technical and the economic: secondly by placing greater emphasis on the extent to which governmental projects overlap and recognising the new practices that emerge as hybrids from such processes; thirdly by acknowledging the diversity of coalition members and focussing on the work done to keep them together and make them effective rather than on the discursive glue that is often though to unite them.

Insight into the difficulties faced by any agency attempting to control practices is the third theoretical contribution of the thesis, and comes from the insights gained from the work of John Law and Jonathon Murdoch discussed in Chapter Two. It is argued that the unruly and unintended nature of governing is a product of the built in multiplicity of socio-technical relationships; a point which is insufficiently attended to in accounts of governing which study only its social, and political aspects. The thesis develops this position by integrating the work of Hudson (2004; 2005) and Jessop (2008) on the state – economy relation with that of Foucault on power (Foucault, 1982; Hindess, 1996; Crampton and Elden, 2008; Foucault, 2008) and the after-networks literature (Kwa, 2002; Law and Mol, 2002). It is argued that both humans and non-humans, ways of thinking, and economic structures have the capacity to 'make moves' in energy efficiency networks, whether to enable or inhibit change, and that very often the capacities of the heterogeneous entities embroiled in networks are not exhausted by any single governmental attempt to structure practice. Rather networks share components, just as fuel poverty and climate change share houses, infrastructures, energy markets and so on. The result is that although they might be discursively discrete governmental projects are materially interdependent and many discourses, regimes and framings interact through shared technologies simultaneously and in ways that each other find difficult to control.

For government this means that every intervention has multiple consequences many of which are obscured from view, or possibly overlooked. Through this process several effects come from each cause, both unravelling the linear logic of much policy making and providing an insight into why practices are so resolutely unruly. Chapter Six

argues that this openness of outcomes is an inevitable problem of the centrifugal mode of governing adopted in the UK as a result of the alignments required to make policy reach into localities. Furthermore, the thesis shows that governance in the UK is both deliberative and centrifugal and that these two positions are not mutually exclusive. Indeed in energy efficiency it is argued that the state institutions structure practices but that their work is also structured by the work of strategic work of discourse coalitions. The thesis, through its analysis of practices of policy implementation, the outcomes for communities, by tracing chains of connections between state institutions and households and by noticing the material traces of governmental diagrams, shows that structuring opportunities and framing the possible are key aspects of the work of discourse coalitions, government institutions, and niche governance entrepreneurs. What is more, the thesis shows that living within these frames and structures is never as restricting as it may appear as the overlapping nature of various such structures generates myriad possible ways in which to experience the everyday. This insight also suggests that by attending to the key sites of techno-economic overlap potentially more could be done to manage the coordination of energy efficiency interventions and to structure relations so that outcomes might be fairer and more sustainable.

7.7 Contribution to Practice

As discussed, feeding the thesis main findings back to practitioner audiences was an important part of the project (details can be found in Appendix Two). Not only did it provide an opportunity for those involved in the project to respond to the findings, and in many ways provide a touchstone for an iterative analysis process which has shaped

the chapters, engaging with practitioners has also provided an opportunity to find out how the thesis and the ideas developed over the course have already and may continue to inform practice. There are three key ways in which the thesis will make a real contribution to the work of energy efficiency practitioners.

Firstly, the identification of two phases of local policy coordination by niche governance entrepreneurs identified in Chapter Five was felt by practitioners to be a particularly useful insight into the work going on across the country, outside of their own local and regional networks to implement the policies. Interestingly several actors currently working in areas that are, or are about to be, in the first phase of policy implementation found it enormously helpful to be able to recognise their position in a longer process and to be able to anticipate the challenges that would develop as the arrangements being created would mature and the policies near conclusion. Also, Newcastle City Council which was nearing the end of the second phase commented on how useful it was to be able to chart their progress in this way and to be able to acknowledge their position as both a pioneer but also as a locality facing a new challenge. They explicitly commented that the report for practitioners would be "really helpful when we're writing our new (low carbon) strategy" (Informal meeting with local authority) in planning what a third phase might look like. In particular they commented that they had appreciated learning about models of coordination from other areas.

Secondly, a problem facing the energy efficiency sector as a result of its huge growth in recent years is that many governance practitioners are new in post and new to the

field. This left them in a position of being faced with what one described as “the policy blizzard.” (Informal meeting with local energy advisor) In feedback sessions they commented that they found the patterns approach to be a very useful way of thinking about the overlapping demands on their time, their organisations’ resources and the their clients’ everyday lives. By having the sense of complexity and multiplicity identified by someone they perceived to be a professional, academic researcher many remarked that they felt empowered to acknowledge the problematic, unruly complexity of trying to script clients’ lives into new ways of using energy. Previously they had felt that they should be able to script practices more tightly by trying to perpetuate what they deep down recognised as competing and often contradictory governmental discourses. This sense of empowerment, the sense that they themselves were not at fault, but rather they were caught between discordant governmental projects was something that many practitioners at the feedback sessions welcomed and wanted to learn more about. As well as finding the area studies useful for comparative purposes, they welcomed the way that the project took seriously the mundane aspects of energy use and connected them to the complexities with which they were familiar. This process encouraged several stakeholders and participants at dissemination events and other meetings to question their understandings of how everyday life is structured by interacting political and cultural, as well as economic and technological factors. As Chapter Three argues, drawing on Winn (2008) and Walcott (2001), encouraging such altered understanding is one of the principle ways in which qualitative research can have practical outcomes beyond the academy.

Thirdly, and building on the second point, the most persistent problems facing governing agencies have not been overcome by the current suite of policies. The thesis argues that these remain unresolved because of the multi-faceted and connected nature of the challenges and the fact that they have been addressed by policy interventions which are disconnected at the national level and are written to precipitate the emergence of NGEs to coordinate them. These challenges require responses from governing agencies which are more than technical, more than economic and more than discursive and which challenge the status quo which favours large incumbent key operational partners of the government. The contribution made by the thesis is that the conceptual approach taken has illuminated the problems but also the possibilities of thinking about governing as a process of creating arrangements of economic structures, technical conditions and ways for individuals, businesses and communities to understand, interpret, connect and interact with them. In particular, stakeholders recognised and welcomed the emphasis placed on the inter-connectedness that would be required in effective solutions, and the way in which the analysis enabled them to think more clearly about the processes influencing their work, as well as the lives of their clients and tenants.

7.8 Future Research

Research into climate change mitigation will, one can be sure, only grow in volume and diversity in the coming years. The thesis has argued however that domestic energy in particular must be at the heart of the expanding climate change research agenda. Not only because it is so critical to any comprehensive response to climate change, but because understanding energy efficiency might also lead to improvements in the

welfare and wellbeing of millions of households. In particular, the creative potential to design policies which are built to provide coordinated responses to these issues, to be flexible and to incorporate rather than overlook the social, technical and economical complications of energy efficiency is where this thesis seeks to inspire and inform future research.

Throughout, the thesis has discussed the socio-techno-economic complexity faced by those trying to act in energy networks to bring about political and environmental objectives. In both the conceptual work undertaken here, and the political work of those putting pressure on governing institutions and key operational partners, there is a recognition that the current status quo is not adequately meeting, and is unlikely to meet in the near future, the UK government's objectives relating to fuel poverty and climate change. Most policy makers encountered were in agreement that a new generation of policies were required and the life span of the current suite of programmes, coupled with the consultation process already underway for post 2011 suggests that there is a genuine openness about what might replace the CERT, Warm Front, DCHS era. This debate, for most, boils down to what role the national state institutions can and should play in the era to come.

As argued in Chapters Five and Six, there is currently a preference for market based policy intervention, as observed by Mitchell (2008) and as explicitly stated in the era defining Energy White Paper 2003 (DTI, 2003) and as can be seen more recently in the extension of the CERT. Few are really suggesting that markets should be removed entirely from visions of a new low carbon, low cost energy future as commercial

exchange and supply would be required at the fringes of even the most nationalised solution. However, whether markets ought to be forced into the heart of energy efficiency governance as they are now, and the extent to which they should and could be deliberately shaped, are issues that are very much open for debate. The thesis has argued in various ways that for carbon dioxide emissions and fuel poverty numbers to be sufficiently reduced a far wider range of technologies must be brought into differently configured economic and culturally connected formations, but has been unable to speculate about what these might be and has instead focussed on analysing the current scenarios. Further research however is urgently needed to address this issue, and to engage in the ontological politics (Law and Mol, 2002) currently underway as a wide variety of actors, only a small number of whom are academic, generate new ways of coordinating and structuring the domestic energy economy in the UK. In particular, research is needed to consider how the relationships between state, markets, and technologies might be reconfigured and reconceptualised. The combination of social, technical and economic aspects shared by states, markets and technologies are brought together and affect each other in many ways but it has been observed that what they all share is that they are the products of some kind of design. The relationships and causal connections between policy, product and market designers now present a rich and politically urgent field of research. The relational nature of the design process, which is now attracting the attention of social scientists such as Shove (2008) and Mitchell (2008), and how design practices combine and align the social, technical and economic phenomena to create markets, policies, technologies, products and services is an area where further research could enlighten and inform energy scholars and practitioners.

There are a multitude of ways to imagine what such an active state capable of mobilising new technologies might look like, and these vary in terms of their 'stateness' and 'marketness,' but most propositions currently circulating in the energy efficiency sector remain versions of a third way (Giddens, 1998) in which the state finds ever more effective ways to push and shove energy technology and retail markets into new shapes. Perhaps the proposal with most 'stateness' is the National Energy Efficiency Programme suggested by NEA which would see a nationally organised mass installation of whichever technologies will bring the SAP rating of a property, (the standardised rating for energy performance), up to its maximum potential level. This might not look like a market in itself, but it would provide a guaranteed work for all kinds low energy businesses and has the potential to make the kind of hardware changes identified as being important opportunities to re-wire energy practices. (Walker and Cass, 2007; Walker, 2008)

On the other hand, solutions with a higher degree of 'marketness' include calls from Mitchell (2008) for the state to "intervene to create the niche and nursery markets *and* then to enable market expansion' (p93) rather than revert to command and control, which resonate with Smith's (2005) call for us to reconsider the potential of markets to create socially beneficial, and in this case environmentally beneficial, outcomes. This does involve picking winners - something which has become a taboo for many commentators supportive of the power of the market to select technology directions - but as Mitchell argues, it can be proved that markets with the current low level of regulation have failed to successfully select technology trajectories in the context of sustainable energy over the last twenty five years (Mitchell, 2008, p93). Calls for caring markets from authors like Smith (2005) do not need to be seen as in opposition to the call from Mitchell (2008) for an instrumental state working with energy markets

and their derivatives; rather the thesis seeks to provoke further research into how socio-techno-economic relations might be cajoled into arrangements, which to some might look like markets but to others may look like new forms of welfare and environmental protection. The thesis has argued that the constructedness of markets and their constant regulatory refinements amounts to a blurring of the boundaries between 'stateness' and 'marketness' which makes their opposition a false one. Furthermore, the thesis has demonstrated that future research on achieving fuel poverty and low carbon objectives should certainly attend to exactly how states and markets can be reconciled and indeed be recognised to be mutually enmeshed, interdependent entities which, when considered to be different dynamic, loosely bound and permeable systems of socio-techno-economic interaction rather than ideologically and normatively opposed permanent structures, might together have the capacity to produce fairer and more sustainable outcomes. Examples of the kind of ways in which this might be achieved include the use of feed in tariffs to guarantee a return on investments in micro-generation, energy tariffs related to properties' SAP ratings or potential SAP ratings, lease arrangements for more expensive micro-generation technologies, smart meters calibrated to work with vulnerable households rather than against them, as credit meters often are, as well as interventions which examine the potential to better connect technology design and policy designers.

As well as these governance and energy specific research agendas, the thesis has also integrated two major conceptual approaches; Foucauldian understandings of government with the insights into complex heterogeneous networks offered by the legacy of ANT. By starting with the energy challenges of everyday life and tracking

the ways in which they are connected to, isolated from and aligned with commercial and governmental projects and economic and technical frameworks the thesis has demonstrated the analytic and political potential of analysing power through practices. In particular it has opened up new possibilities for future studies of how governance is constituted by practices which in many ways are pre-structured by processes with myriad origins and has also illustrated how different structuring forces overlap and interact and create complex, hybrid outcomes.

Appendix One: Methodological Appendix

Participant Consent Form

The Economic and Social Research Council (ESRC) and the University of Durham attach high priority to the ethical conduct of research. We therefore ask you to consider the following points before signing this form. Your signature confirms that you are happy to participate in the study.

Your contribution to the research will take the form of an interview and / or home tour. This will be recorded and kept securely. The transcriptions (excluding names and other identifying details) will be retained by the project team and analysed as part of the study.

We will send you your own interview recording back to you after it has been anonymised. That way you can keep a copy of our conversation. We will also give you time to check it over. You can make changes if you want, and advise us of anything else we should do to protect your privacy.

The findings of the research will be written up as feedback for you, policy makers and for other organisations interested in our work. The findings will be published, and they may also be used for teaching and research training. The written work may include quotations from interviews, but individuals will never be named.

Approximately 50 people from all walks of life are taking part in this phase of the work. Your contribution is immensely valuable. However, if, at point during the course

of the project you wish to withdraw from the study we will respect your decision immediately.

Confirmation and consent

I confirm that I understand the points above and agree to participate in this research project. I have been given the opportunity to ask questions about this project and my involvement in it. I understand that the material is protected by a code of professional ethics. I hereby assign the copyright of my contribution to the University of Durham.

Participant's name: _____
Signature: _____ **Date: _____**

I confirm that I have explained the points above to the participant and given him/her the opportunity to ask questions. I have not forced him/her to be involved in this research.

Researcher's name _____
Signature: _____ **Date: _____**
Department of Geography, University of Durham, Science Laboratories, South Road, Durham. DH1 3LE

Discussion Points for Practitioners

You

1. What are your core roles?
2. What are the core problems you are working to address? (health, access to benefits etc?)
3. Who are the actors you work with?
4. What are the links between you all? (formal, funding, social, networks etc.)
5. What are the obstacles to achieving your objectives?
6. What is your contribution to energy efficiency in your area?

Householders

7. How do you link your work to householders?
8. What do you think householders want? How do know?
9. What are the obstacles they face?
10. How do you think householders make energy use decisions?

Power

11. Who or what is in the driving seat in all this? Leadership? Why?

Sustainable Energy

12. What is sustainable energy to you? (*link between social equity, welfare etc. and environment?)*

    1. *Are you aware of any conflicts (cost of green energy etc?, desire to burn more energy?)*

13. Where do your priorities lie? Why?
14. What is being done to coordinate social and environmental issues around

energy in your area? - What do you make of policy and the practical implementation you are aware of? *15.* Obstacles to this?
Suggestions 16. How would you change fuel poverty 'management' for the better? 17. How would you change climate change 'management' for the better? 18. How would you bring these things together?
19. Is there anything that you'd like to talk about that we haven't covered?

Householder Research: Home Tour & Interview Schedule

Starting

- Focus on things – That's nice. Where did you get it? How do you use it? What do you like about it? What don't you like? etc. …

- Focus on Processes & Routines – What do you do first thing in the morning? What do you do at different times? (lunch, home from work, bed time, evening, afternoons etc.)

Futures

- How do you feel about the recent price rises?
    - *What would you do if they were to rise again this year?*
    - *How would you cope?*
- If your income went up would you be greener of not?
- If your income fell would you be greener or not?
- How would you feel about different ways of heating your home, like burning wood, using heat pumps, district heating? *(may require explanation)*
    - *Would you welcome things like that?*
- What about different ways of paying?
    - *Why do you pay the way you do and would you change your payment method?*
- How would you feel about your power supplier leasing you (or renting you) a mini generator for less than your current bill to let you make your own energy, possibly selling some of it back to them?
- How would you feel if you were told that the best way to get out of fuel payment difficulties was to receive a benefit? One you might already be eligible for?
- How would you feel about a personal Carbon Account? You would have a set amount of carbon to use up. If you use less than your amount you could sell it to others, and if you need more you can buy it from others through a national exchange programme.
    - *Would that encourage you to be green?*
    - *Would it make you sacrifice warmth for earnings from your carbon surplus?*
- Would you consider a green price plan, where all the energy comes from renewables?

    - *It is more expensive, does that matter?*
- Would you welcome green taxes?
- Would / have you consider(ed) investing in energy efficiency?
    - *How did you make that decision?*
    - *What influenced it ? –(policy, grants, savings, income, background etc.)*
- Would you like to see a special low cost price plan, which would be a recognised tariff for people vulnerable to fuel poverty?
    - *What if it was enforced by the government?*
    - *What if it was given a 'kitemark' or approval from charities like NEA and Energywatch?*
- (either)
    - Would or could you ever become greener in you energy use?
        - *What would it take? How far are you from it now?* (or)
    - Would you ever consider yourself vulnerable to fuel poverty?
        - *What would it take for you to put yourself in that category? How far are you from it now?*

Home Energy Tour (Spoken and Photographed)

Here the householder leads GP through the home describing energy use at each location. GP will try to encourage the householder to talk about freedom and constraint, consumption and restraint, skills in interaction and motivation. GP will take still photos of some of the key places of interaction between individuals and technology, individuals and buildings, places of significance etc. This will hopefully encourage the householder to want to take some photographs of their own. The participant will be invited to take photographs of places or objects of significance that convey their unique experience of energy use.

Open Questioning

- What motivates your energy use decisions?
    - *What intrudes or impairs your ability to use energy as you would like*?
- Do you ever think about energy consumption?
    - *How do you think about it? Through calculations of energy cost /emissions? Using your senses about temperature, comfort etc.?*
- When do you think about energy consumption?
    - *Times of year, month? Day/ night?*

    - *What prompts you to think about energy use?*
- What worries you?
    - *Ideas about health, finances, the planet, people's opinion etc.?*
- Comfort – *What is a comfortable temperature?*
    - *Are you entitled to feel thermal comfort at home?*
- How does energy use compare with other things you think about in your everyday life at home?
    - *home improvement*
    - *food / diet,*
    - *health*
    - *relationships*
    - *work*
    - *money*
    - *others*
        - *Do thoughts about energy come into thoughts about these other things?*
- How does the house / building shape your energy use decisions?
    - *Is it a hard home to heat? Easy?*
    - *Expensive? Cheap?*
- How do the technologies and appliances shape your energy use decisions?
    - *How do you heat your home?*
    - *What do you do if it is not hot enough? Too hot?*
    - *How do you know when it is too hot or too cold?*
    - *What temperatures are right?*
    - *How much fresh air is in the home? How? Why?*
- Are there any problems with your home energy that you can't solve?
    - *For example, you can't stop heat escaping up the chimney? Or you can't switch the TV box off without losing your settings, etc.? You can't fix the central heating?*
    - *What are the obstacles? Why can't they be overcome?*
- How do ideas about climate change and the environment shape your decisions
    - *Government campaigns about saving energy?*
    - *Campaigns from your electricity / gas provider?*
    - *Where else do your ideas about the environment come from?*
- How do thoughts about your fuel bills and the cost of fuel influence you?
    - *Where do these thoughts come from? The bills / meter? The press / news? Bank account?*
    - *How do you know how much you are spending?*
- How do feelings shape your decisions?
    - like fear, worry, confusion, confidence,
- What is energy efficiency to you?
    - *What does it connote? Sustainability, environment, equity, saving*

money, future generations, this generation.
    - *What are your priorities? Why? What would change these priorities*
- How do you feel about the ways the government addresses energy efficiency?
    - *Are you aware of government?*
    - *Policy, funding, grants, media & communication*
        - *The green angle, the social angle the health angle*
    - *What would you change about government initiatives?*
- How do you respond to these ideas? *Do they make sense to you?*
    - *Why? What influences this process?*
- Do you think there's a way to tell government what you want?
- Do you think there's a way to tell suppliers what you want?
    - *Do / Would either listen?*

Wards Selected

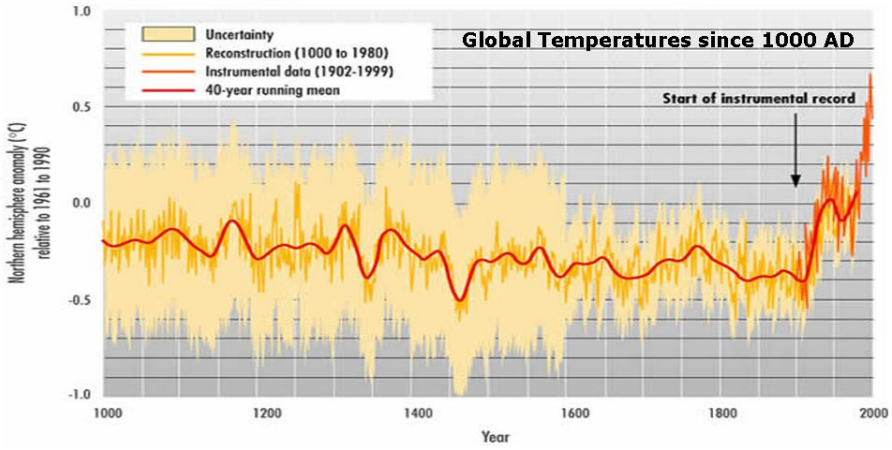
- 3 wards from Eden:
    - Ullswater, Dacre, and Penrith East.

- 3 Wards from Kirklees:
    - Greenheads, Newsome, Cleckheaton.

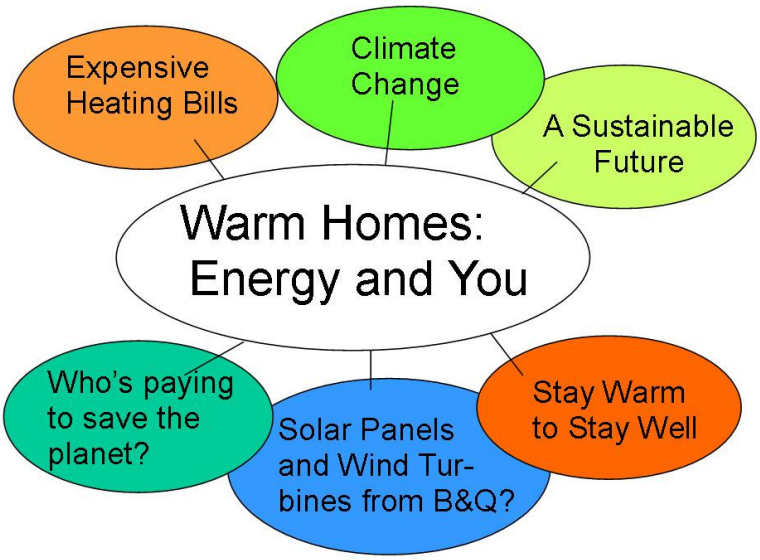
- 2 Wards from Newcastle:
    - North Heaton, South Heaton.

Householder Research Photo Response Poster

Warm Homes: Energy and You



Householder Recruitment Poster



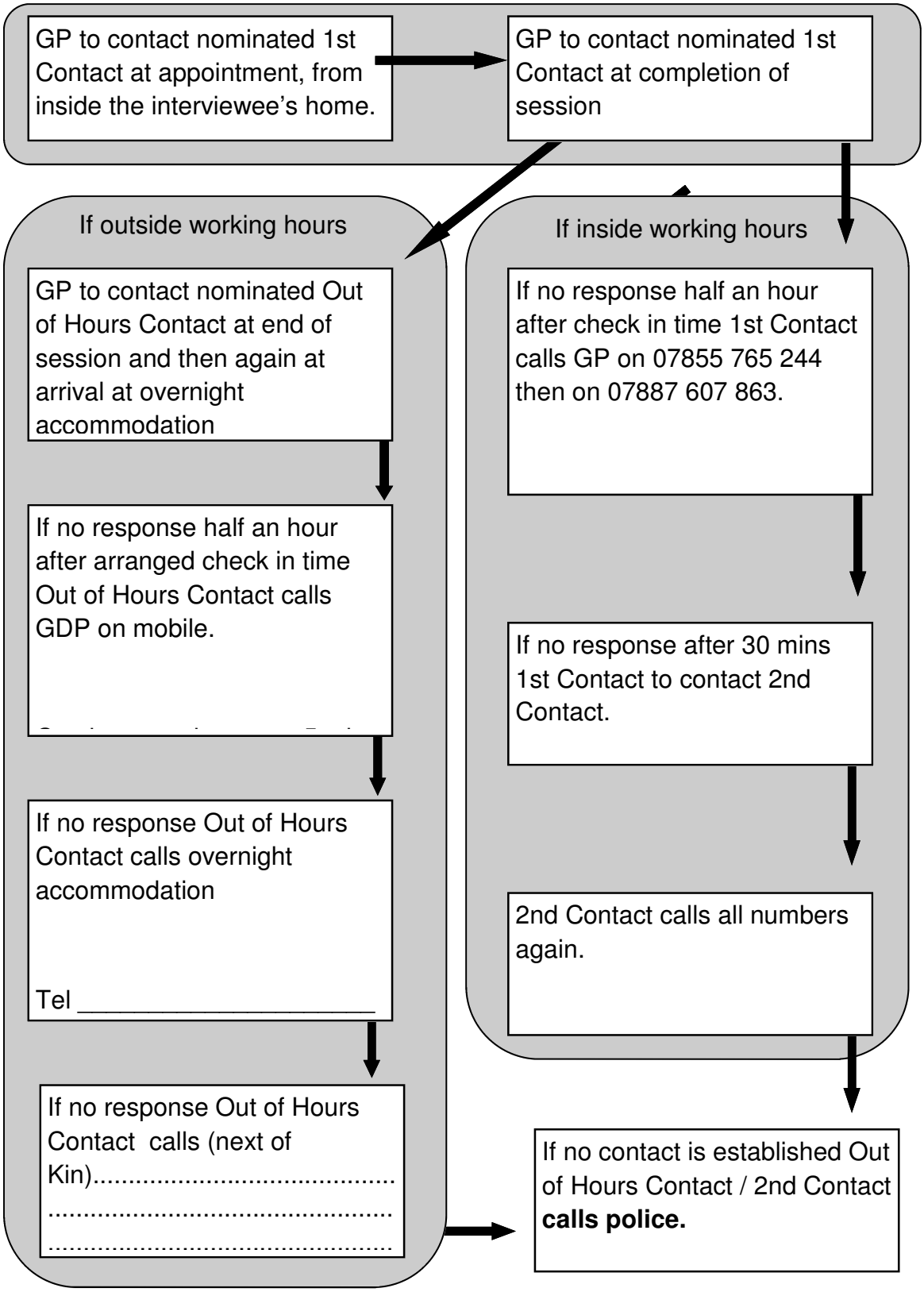
If you would like to participate in research into energy efficiency in the UK please get in touch now - this year counts.

The University of Durham, the UK's Economic and Social Research Council and NEA, a charity campaigning for warm homes in England, are supporting a research project looking at energy use in the home. It is hoped that the study will help address the problems of expensive fuel bills and greenhouse gas emissions from English homes.

Contact Gareth Powells at Durham University on 0191 334 1853, 07855765244 or email g.d.powells@durham.ac.uk

Home Visit Safety Proforma

Gareth Powells	
Name of Nominated 1st Contact.	
Name of Nominated 2nd Contact.	
Name of Interviewee	
Unique Interview number	
Address	
Telephone Number of Venue	See calendar
Date of Visit	See calendar
Start time (time of check-in call)	See calendar
End time (time of check-in call)	See calendar
Details of Transport (train times including changes, car registration and details, etc.)	Driving in VW Polo,
Comments:	



Completed copy of this form to be left with nominated contact and a further completed copy to be stored at gdpfieldwork@yahoo.co.uk (password skylab).

Appendix Two: Dissemination

Scholarly Meetings Arranged / Coordinated

Durham University Geography Department postgraduate workshop, 'ANT and After', 2007.

Durham University Geography Department postgraduate workshop, 'Climate Change Policy for Physical Geographers, 2007.

Inaugural Meeting of the Housing Wealth Think Tank, Durham University Institute for Advanced Study, February 2007.

Carbon Markets: A master-class workshop with Professor Donald Mackenzie and Professor Michel Callon, Durham University Institute for Advanced Study, November 2007.

Centre for the Study of Cities and Regions (CSCR) Sustainable Communities Event, Durham University 2008.

Talks Given

NEA North East Forum, "Researching You: Local Energy Practitioners and Household Practices", Newcastle, 2006.

Geographical Imaginations, 'Policies and Practices of Energy Efficiency', Newcastle University, 2006.

ECPR Environmental Politics Summer School, Keele University, June 2006

Climate Change Research Group, Oxford University, Oxford University, 2006

Central and Northern England Postgraduate conference (CANE), 'What is Policy? Linearity and Turbulence in UK Energy Policy', Newcastle University 2007.

Durham University Geography Department Research Cluster Meeting on Researching the Elderly, 'Ethics of Researching Older People', 2007.

AAG Annual Meeting 2007, 'Complexity and Ontological Politics In The New Carbon Economy: The UK's Energy Efficiency Commitment', San Francisco, 2007.

RGS – IBG Annual Meeting 2007, 'Niche Hybrids in the Complex Geographies of Entrepreneurial Energy Policy Implementation', London, 2007

RGS – IBG Annual Meeting 2007, Policies and Practices of Domestic Energy Efficiency', London, 2007

NEA North East Forum, Sunderland Glass Centre, 2008.

NEA Business Supporters Group Annual Meeting, Leeds, 2008.

RGS – IBG Annual Meeting 2008, London.

Association of American Geographers Annual Conference 2008, Boston

NEA Annual National Conference, University of Birmingham, 2008

Events Attended

Gateshead Warm Zone Training and Awareness Day, 2007

SEE the Impacts, Examining the Social, Environmental and Economic impacts of fuel poverty through local and regional action, Newcastle Upon Tyne, 2007.

Carbon Innovation Exchange, Gosforth Park Hotel, Newcastle, March 2008.

Policy Development Networks Invited to Contribute to

Kirklees Affordable Warmth Steering Group, Huddersfield, 2008

Durham County Council Rights to Warmth Steering Group, 2009

Publications

Powells, G. D, "Housing Dynamics: Environmental Aspects", International Encyclopaedia of Housing and Home, Elsevier, Forthcoming

Powells, G. D., 'Complexity, Entanglement and Overflow in the New Carbon Economy: The Case of the UK's Energy Efficiency Commitment', Environment and Planning: A, Forthcoming, October 2009. Part of a themed special issue entitled, 'Theorising the Carbon Economy'.

Powells, G. D., "Book Review: Mitchell, C., The Political Economy of Sustainable Energy", Area, September 2009.

Sims-Williams, D.B., Bulkeley, H.A., Matthews, P.C. and Powells, G. D., for EAGA PLC, Potential Water Savings through the use of HL2024 Shower Flow Regulators, February 2008

Powells, G.D. and Saunders, J., (Ed), NEA Report for DEFRA, UK Energy Research Centre Energy and Equity Workshop Report, March 2007

Bibliography

ACE, 2008 Clever Homes, [Online] , Http://Www.Ukace.Org/Index.Php?Option=Com_Content&Task=View&Id=44&Itemid=26, (Accessed 10/01/2008)

Acs, , Z. J., Audretsch, D.B., Braunerhjelm, P., and Carlsson1, B., 2006, *The Knowledge Spillover Theory of Entrepreneurship*, CESIS Electronic Working Paper Series, Paper No.77, -Online], available at http://www.infra.kth.se/cesis/documents/WP77.pdf, Accessed 01/09.2009

Age Concern, 2008, [online], Available at http://www.ageconcern.org.uk/AgeConcern/fightthefreeze_facts.asp, [Accessed 31/06/2009]

Aglietta, M., 2000, *A Theory of Capitalist Regulation*: The US Experience, London, Verso

Alario, M. and Freudenburg, W. (2008) "*Environmental Risks and Environmental Justice: Or How The Titanic Risks Are Not So Titanic, After All*" Paper Presented At The Annual Meeting Of The American Sociological Association Annual Meeting, Sheraton Boston and The Boston Marriott Copley Place, Boston, MA, Jul 31, 2008

Alario, Margarita. and Freudenburg, William. "*Environmental Risks and Environmental Justice: Or How the Titanic Risks Are Not So Titanic, After All*" Paper presented at the annual meeting of the American Sociological Association Annual Meeting, Sheraton Boston and the Boston Marriott Copley Place, Boston, MA, Jul 31, 2008

Allen, J., (2003), *Lost Geographies Of Power*, Blackwell, London.

Amin A and Thrift N, 2004, "Cultural Economy: the Genealogy of an Idea", in Amin A and Thrift N (Eds.), *Cultural Economy*: A Reader, Sage, London

Backstrand, K (2004) Scientisation Vs. Civic Expertise In Environmental Governance: Eco-Feminist,Eco-Modern and Post-Modern Responses, *Environmental Politics*, Vol.13, No.4, Winter 2004, Pp.695 – 714

Baker, W., Preston, I., and White, V., (Unpublished, 2007), *Geographic Equity Of Fuel Poverty Schemes – Scoping Study, Report To EEPFH, Fuel Poverty Strategy Group* [Online] Available From < Www.Cse.Org.Uk>

Barnes, T., The place of locational analysis: a selective and interpretive history , *Progress in Human Geography,* Vol. 27, No. 1, 69-95 (2003)

Barr, S. and Gilg, A. W. (2007) 'A conceptual framework of environmental behaviour' *Geografiska Annaler B* 89 (4), pp. 361-379.

Barr, S., (2006), "Environmental Action In The Home: Investigating The "Value-Action" Gap", *Geography*, Volume 91(1), ,pp 43-54

Barry, A., (2001), *Political Machines*, Athlone, London.

Barry, A., (2002), "In The Middle Of The Network", In *Complexities: Social Science Of Knowledge Studies*, Eds Law, J., & Mol, A. , 2002, London: Duke.

Barry, A. and D. Slater (2002) Technology, politics and the market: an interview with Michel Callon. *Economy and Society*, 31(2): 285-306

Bennett, J., (2005) "The Agency Of Assemblages and The North American Blackout", *Public Culture*, Vol 17, No. 3

Bennett, J., (2006) "The Force Of Things: Steps Towards An Ecology Of Matter", *Political Theory,* Vol 32, Number 3

Bentham, J., 2009, An Introduction to the Principles of Morals and Legislation , Dover, London.

Berkhout, F., Harris, M., Sorrell, S. and Watson, J., (July 2003) Developing A Strategy For Social Science Research On Energy Science and Technology Policy Research (SPRU), University Of Sussex .

Bevir, M. and Rhodes, R. A. W. *Interpreting British governance,* Mark Bevir and R.A.W. Rhodes Routledge, London : 2003.

Bickerstaff, K., and Walker, G., (2003) "The Place(S) Of Matter: Matter Out Of Place - Public Understandings Of Air Pollution*", Progress In Human Geography* 27,1 (2003) Pp. 45-67

Blunt, A., (2003) "Home and Identity: Life Stories In Text and In Person", In Blunt, A., Gruffud, P., May, J., Ogborn, M. and Pinder, D., *Cultural Geography In Practice*, London, Arnold

Boardman, B (2004a) "Achieving Energy Efficiency Through Product Policy: The UK Experience." *Environmental Science and Policy*, 7(3), Pp. 165-176

Boardman, B, (1991) "Fuel Poverty: From Cold Homes To Affordable Warmth", London, Belhaven.

Boardman, B. (2004b) "New Directions For Household Energy Efficiency: Evidence From The UK." *Energy Policy*, 32 (17): 1921 - 1933

Bradshaw, J.R. (1979) 'The fight for a fair fuel policy', *New Society*, 47, 858, 614-615

Brandon, G and Lewis, A (1999), "Reducing Household Energy Consumption: A Qualitative and Quantitative Field Study", *Journal Of Environmental Psychology*, 19, p 75-85

Braun, B (2005), "Environmental Issues: Writing A More-Than-Human Urban Geography", *Progress In Human Geography* 29, 5 Pp635 – 650

Brennan, Andrew, Lo, Yeuk-Sze, "*Environmental Ethics*", The Stanford Encyclopedia Of Philosophy [Online] (Spring 2008 Edition), Edward N. Zalta (Ed.), (Accessed 5/01/2008) <Http://Plato.Stanford.Edu/Archives/Spr2008/Entries/Ethics-Environmental/>.

Brenner, N., (2004), *New State Spaces*, Oxford University Press, Oxford

Brenner, N., and Theodore, N., (2002), Preface: *From The 'New Localism' To The Spaces Of Neoliberalism,* Antipode, Volume 34, Issue 3, Page 341-347, Jun 2002

Brenner, N., Jessop, B., Jones, M., and Macleod, G., (2003), *State / Space*, Blackwell, London.

Bruman, A., 2004, *Social Research Methods* Oxford University Press, Oxford.

Bulkeley H, Watson M, Hudson R, (2007), "Modes Of Governing Municipal Waste" *Environment and Planning A* 39(11) 2733 – 2753

Bulkeley, H. & Betsill, M.M. (2003). Cities and Climate Change: Urban Sustainability and Global Environmental Governance. New York.: Routledge

Bulkeley, H. & Moser, S.C. (2007). "Responding To Climate Change: Governance and Social Action Beyond Kyoto", *Global Environmental Politics* 7(2): 1-10.

Bulkeley, H. (2005). Reconfiguring Environmental Governance: Towards A Politics Of Scales and Networks. *Political Geography* 24(8): 875-902.

Burgess J, Harrison C M, Filius P, 1998, "Environmental communication and the cultural politics of environmental citizenship" *Environment and Planning A* **30**(8) 1445 – 1460

Caldecott, Ben and Thomas Sweetman, 2009, *Warm Homes: Delivering energy efficiency improvements in the UK, Policy Exchange* [Online] Available at http://journals.cambridge.org/spd/action/digest?type=old&category=Housing&topic=Standard%20of%20housing, (Accessed 02/05/2009)

Callon, M., (1998), *The Laws Of The Markets*, Blackwell Publishing: London

Callon, M., (1999), "Actor-Network Theory – The Market Test", In *Actor Network Theory and After*, Eds Law, J., and Hassard, J., Blackwell:London

Callon, M., (2006), "Why Virtualism Paves The Way To Political Impotence: A Reply To Daniel Miller"S Critique Of The Laws Of The Markets", *Economic Sociology* , 6 (2), 3-21.

Callon, Michel, Méadel, Cécile and Rabeharisoa, Vololona, (2002) "The Economy Of Qualities", *Economy and Society*, 31:2, 194 - 217

Cantrill, J., and S. Senecah. 2001. "Using the 'Sense of Self-in-Place' Construct in the Context of Environmental Policy-Making and Landscape Planning," *Environmental Science and Policy* 4(Fall):185-203

Carabine, J. (2003) "Unmarried Motherhood 1830-1990: A Genealogical Analysis" In Wetherell, M., Taylor, S. and Yates, S. (Eds) *Discourse As Data: A Guide For Analysis*, London: Sage

Castree, N, (2002), Environmental Issues: From Policy To Political Economy, *Progress In Human Geography* 26,3 (2002) Pp. 357–365

Castree, N., and Nash, C., (2004), Mapping Posthumanism: An Exchange, *Environment and Planning A*, 2004, Volume 36, Pages 1341 - 1363

Castree, N., Nash, C., Badmington, N., Braun, B., Murdoch, J., and Whatmore, S., (2004), "Mapping Posthumanism: An Exchange", *Environment and Planning A* 2004, Volume 36, Pages 1341 – 1363

CEEAC, (2009), *Ashden Awards*, [Online], Accessed 3/2/2009, Available At Www.Greenenergytv.Com/Watch.Aspx?=1768083115

Crampton, J. & Elden, S. *Space, Knowledge and Power: Foucault and Geography*. Aldershot: Ashgate; 2007.

Crang, M., (2003), "Qualitative Methods: Touchy, Feely, Look-See?", *Progress In Human Geography* 27,4 (2003) Pp. 494–504

Crang, M., (2005), "Qualitative Methods: There Is Nothing Outside The Ext?", *Progress In Human Geography*, 29, 2 Pp.225-233

Critchley, R., (1997), *Cold Homes and Health*., Eaga Charitable Trust, Keswick

Critchley, R., Grimsley, M., Gilbertson, J., Green, G ., (2007), "Living In Cold Homes After Heating Improvements: Evidence From Warm-Front, England's Home Energy Efficiency Scheme", *Applied Energy*, Volume 84, Issue 2, Pages 147-158.

Darby, S., (2008), "Energy Feedback In Buildings: Improving The Infrastructure For Demand Reduction", *Building Research and Information*, Volume 35, Issue 5, Pages 499-508.

Davies, G., and Dwyer, C., (2007) "Qualitative Methods: Are You Enchanted Or Are You Alienated?" *Progress In Human Geography* 31(2) (2007) Pp. 257–266

De Certeau, M., 2002, *The Practice of Everyday Life*, University of California Press.

Dean, M, (1999), *Governmentality*, Sage, London

Deleuze, G., 1999, *Foucault*, Continuum, London.

Demeritt, D., and Lees, L., (2005), Research Relevance, "Knowledge Transfer" and The Geographies Of Case Studentship Collaboration, *Area* (2005) 37.2, 127–137

Denzin, N. K., (2001) The Reflexive Interview and A Performative Social Science, *Qualitative Research*, 1, 1, P23-46

Denzin, N. K., (2003), Reading and Writing Performance, *Qualitative Research* 3, 2, Pp243-268

Denzin, N. K., (2004), "Introduction", In Denzin N. K., and Lincoln, Y. S., (Eds) *The Sage Handbook Of Qualitative Research: Third Edition,* London: Sage

Department For Business, Enterprise and Regulatory Reform, "*Fuel Poverty Strategy*", [Online], (2001), Available At Http://Www.Berr.Gov.Uk/Energy/Fuel-Poverty/Strategy/Index.Html, (Accessed 24/3/2009)

Department For The Environment, , 1990, *This common inheritance. a summary of the White Paper on the Environment*. Published in 1990, H.M.S.O. (London)

Department For The Environment, Farming and Rural Affairs, (2008), *The Uk Fuel Poverty Strategy 6th Annual Progress Report*, [Online], Available At Http://Www.Berr.Gov.Uk/Files/File48036.Pdf, (Accessed 12/4/2009)

Department For The Environment, Farming and Rural Affairs, (2009*), Explanatory Memorandum To The Electricity and Gas (Carbon Emissions Reduction) Order 2008 No. 188*, [Online], Available At Http://Www.Opsi.Gov.Uk/Si/Si2008/Em/Uksiem_20080188_En.Pdf, (Accessed 21/3/2009)

Department For The Environment, Farming and Rural Affairs, 2006, *The Energy Efficiency Commitment April 2008- March 2011: Initial Consult*ation, Http://Wwww.Defra.Gov/Environment/Climatechange/Uk/Household/Eec, (Accessed 12/2/2009).

Department For The Environment, Farming and Rural Affairs, 2007, *Assessment Of EEC 2002-05 Carbon, Energy and Cost Savings*, [Online], Available At , Http://Www.Defra.Gov.Uk/ENVIRONMENT/Climatechange/Uk/Household/Supplier/Pdf/Eec-Assessment-0205.Pdf, (Accessed 25/3/2009).

Department For The Environment, Farming and Rural Affairs, 2007, *Consultation On: Carbon Emissions Reduction Target April 2008 To March 2011*, Department For Food, Environment and Rural Affairs, Http://Wwww.Defra.Gov/Corporate/Consult/Cert2008-11/Letter.Htm

Department For The Environment, Farming and Rural Affairs, 2009, [Online], Accessed 30/3/2009, Available At Http://Www.Defra.Gov.Uk/Environment/Climatechange/Uk/Household/Supplier/

Department For Trade and Industry, 2003, *Energy White Paper: Our Energy Future*, London.

Department For Trade and Industry, 2007, *Energy Statistics*, London: Government News Network.

Department For Trade and Industry, 2007, *Energy White Paper: Meeting The Energy Challenge*, London

Department Of Communities and Local Government, (2007*), English House Condition Survey 2007 - Headline Report* , [Online], Accessed 26/3/2009, Available At Http://Www.Communities.Gov.Uk/Documents/Statistics/Pdf/1133548.Pdf

Department Of Energy, 1982, 'Speech On Energy Policy By The Secretary Of State For Energy', At Cambridge, June 1982, *Energy Paper 51*, HMSO.

Department Of The Environment, Transport and The Regions (2000) , *English House Condition Survey 1996: Energy Report*., London,

Dilling, L. 2007. Toward carbon governance: Challenges across scales in the United States, *Global Environmental Politics*, 7(2): 28-44.

Dilling, L., (2007) "Toward Carbon Governance: Challenges Across Scales In The United States", *Global Environmental Politics*, Vol. 7, No. 2, Pp. 28-44, May.

Donnison, D., 1982, "*The Politics Of Poverty*", Martin Robertson, Oxford

DSDNI, 2004, *Ending Fuel Poverty: A Strategy for Northern Ireland*, [Onlione] Available from http://www.dsdni.gov.uk/index/hsdiv-housing/fuel_poverty.htm (Accessed 12/05/2009)

EDC, *Your Community*, [Online], available from http://www.eden.gov.uk/your-community/, (Accessed 23/05/2009)

Eden LA21, *Green Build Fortnight* [Online] (Accessed 10/01/2008) Http://Www.Edenla21.Org.Uk/Green_Building.Htm

Eden, S , (1999), "We Have The Facts' - How Business Claims Legitimacy In The Environmental Debate", *Environment and Planning A*, Volume 31, Issue 7, Pages: 1295-1309

Eden, S., (1993), "Individual Environmental Responsibility and Its Role In Public Environmentalism", *Environment and Planning A* 25, 1743-58.

Eden, S., (1998), "Environmental Issues: Knowledge,Uncertainty and The Environment", *Progress In Human Geography* 22, 425-32.

Energy Retail Association (ERA), 2007, *The Energy Efficiency Commitment April 2008 to March 2011 – Initial Consultation A response from the Energy Retail Association*, [Online] Available at http://www.energy-retail.org.uk/papers/ERA%20response%20to%20EEC3%20initial%20consultation%20vFinal.pdf, (Accessed on 12/09/2009)

Energy Savings Trust, (2007), *Energy Efficiency Commitment 2005 – 2008; Briefing Note* , [Online], Accessed 30/3/2009, Available At Http://Www.Energysavingtrust.Org.Uk/Uploads/Documents/Housingbuildings/Eec2_CERT_Bn.Pdf

Energywatch, (2008), *Fuel Poverty Campaigners Say Summit Ducks Big Issues, Press Release* [Online][Accessed 15/05/2008]. Available At Http://Www.Energywatch.Org.Uk/Media/News/Show_Release.Asp?Article_Id=1098&Display_Type=Archive

Fairclough, N. (2003) "The Discourse Of New Labour: Critical Discourse Analysis" In Wetherell, M., Taylor, S. and Yates, S. (Eds) *Discourse As Data: A Guide For Analysis*, London: Sage

Fischer, F., and Forrester, J. eds., *The Argumentative Turn in Policy Analysis and Planning* (Durham, NC: Duke University Press, 1993

Flint, J, (2003), "*New Methods Of Reconfiguring Agency and Responsibility In The Governance Of Social Housing: Emerging Evidence From Scotland*", Paper Presented At The Housing Studies Association Autumn Conference 2003: "Community, Neighbourhood, Responsibility", University Of Bristol, 9th and 10th September 2003.

Flint, J, , (2003a), "Housing and Ethopolitics:Constructing Identities Of Active Consumption and Responsible Community", *Economy and Society*, Volume 32 Number 3 August 2003: 611–629

Foucault, 2007, The Meshes of Power, Translated by Gerald Moore, in Crampton, J. & Elden, S. *Space, Knowledge and Power: Foucault and Geography*. Aldershot: Ashgate; 2007.

Foucault, M. (1982). The subject and power, In H. Dryfus and P. Rabinow, (Eds.) *Michel Foucault: Beyond Structuralism and Hermeneutics*. London: Harvester Wheatsheaf.

FPAG, 2007, *Ofgem Consultation on Metering Price Control Review – FPAG Response*, [Online], Available at http://www.berr.gov.uk/files/file34435.pdf, (Accessed on 21/08/2009)

Fuel and Power Advisory Council, 1945, Cmd 6762, '*Domestic Fuel Policy'*, Ministry Of Fuel and Power, HMSO.

Futerra, (2005). *Rules Of The Game: Principles Of Climate Change Communication*. Futerra, London. Http://Www.Defra.Gov.Uk/Environment/Climatechange/Pubs/Pdf/Ccc-Rulesofthegame.Pdf, (Accessed 20 July 2006).

Geels, F. W., 2004, From sectoral systems of innovation to socio-technical systems Insights about dynamics and change from sociology and institutional theory, Research Policy 33 (2004) 897–920

Giddens, A., 1998, *The Third Way: The Renewal of Social Democracy*, Cambridge: Polity. Press.

Giddings, B., Underwood, C., (2007), "Renewable Energy In Remote Communities", Journal Of *Environmental Planning and Management*, Volume 50, Issue 3, Pages: 397-419.

Goodwin, M., and Painter, J., (1996), Local Governance, The Crises Of Fordism and The Changing Geographies Of Regulation, *Transactions Of The Institute Of British Geographers*, New Series, Vol. 21, No. 4, (1996), Pp. 635-648

Gottweis, H., (2003) 'Theoretical strategies of poststructuralist policy analysis: towards an analytics of government', pp. 247–265 in: Maarten Hajer and Hendrik Wagenaar (eds) *Deliberative policy analysis: Understanding Governance in the Network Society*, Cambridge: Cambridge University Press.

Guy, S., and Shove, E., 2000, *A Sociology of Energy, Buildings and the Environment,* London: Routledge

Hajer, M (1995) *The Politics Of Environmental Discourse*, Oxford:Oxford.

Hajer, M., and Wagenaar, H., (Eds), (2003), *Deliberative Policy Analysis: Understanding Governance In The Network Society,* Cambridge Univesity Press; Cambridge.

Halpern, D., (1995), "*More Than Bricks and Mortar? Mental Health and The Built Environment*", Taylor Francis, London.

Harrington, Heyman, Merleau-Ponty, Stockton, Ritchie and Heyma, (2004), "*Keeping Warm and Staying Well: Findings From The Qualitative Arm Of The Warm Homes Project, Health and Social Care In The Community*, 13, (3), 259-267.

Harrington, Heyman, Merleau-Ponty, Stockton, Ritchie and Heyma, 2004, *Keeping Warm and Staying Well: Findings from the qualitative arm of the Warm Homes Project, Health and Socio Care in the Community*, 13, (3), 259-267.

Harrison, P., (2000) "Making Sense: Embodiment and The Sensibilities Of The Everyday", *Environment and Planning D: Society and Space* 2000, Volume 18, Pages 497 - 517

Harvey, D., (1996), *Justice, Nature and The Geography Of Difference*, Blackwell: London

Harvey, D., (2005), *A Brief History Of Neoliberalsim*, Oxford University Press:Oxford

Healy, J. D., and Clinch, J. P., 2002, "Fuel Poverty, thermal comfort and occupancy: Results of a national household-survey in Ireland", *Applied Energy*, 73 (2002) pp 329-343

Hayek, Frederick. A. von. 1937. "Economics and Knowledge." *Economica* (New Series), 4, 33-54.

Hegger, D., Van Vliet, J., & Van Vliet, J.M B. (2007), "Niche Management and Its Contribution To Regime Change: The Case Of Innovation In Sanitation", *Technology Analysis & Strategic Management*, Vol. 19, No. 6, 729–746.

Helm, D., (2003), *Energy, The State and The Market: British Energy Policy Since 1979* (Revised Edition), Oxford University Press, Oxford.

Herbert-Cheshire, L., (2003), "Translating Policy: Power and Action In Australia"S Rural Towns, *Sociologia Ruralis,* Vol 43, 4

Hinchliffe, S. (1996) "Helping The Earth Begins At Home: The Social Construction Of Socio-Environmental Responsibilities", *Global Environmental Change*, Vol. 6, No. 1, P. 53-62

Hinchliffe, S., (1996),Helping The Earth Begins At Home: The Social Construction Of Socio-Environmental Responsibilities, *Global Environmental Change* 6, Pp. 53–62

Hindess, B. 1996. *Discourses of Power: From Hobbes to Foucault*. Oxford: Blackwell.

Hobson, K., (2003), Consumption, Environmental Sustainability and Human Geography In Australia: A Missing Research Agenda?, *Australian Geographical Studies*, 41 (2), 148-155.

Hobson, K., (2004) Sustainable Consumption In The United Kingdom: The Responsible Consumer At Arm"S Length, *Journal Of Environment and Development*, Vol 13, No. 12, 121-139.

Houghton, J., (2004), *Global Warming: The Complete Briefing*, Cambridge University Press, Cambridge

Houwing, M., Heijnen, P. and Bouwmans, I., (2006), "*Socio-Technical Complexity In Energy Infrastructures - Conceptual Framework To Study The Impact Of Domestic Level Energy Generation, Storage and Exchange*", IEEE International Conference On Systems, Man, and Cybernetics, Conference Proceedings, Pages: 906-911

Houwing, M., P.W. Heijnen and I. Bouwmans (2006), *Socio-Technical Complexity in Energy Infrastructures - Conceptual Framework to Study the Impact of Domestic Level Energy Generation, Storage and Exchange*, in: Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics, 8-11 October 2006, Taipei, Taiwan.

Howeisson, S. G. and Hogan, M., 2005, "Multiple Deprivation and Excess Winter Deaths in Scotland", *The Journal of the Royal Society for the Promotion of Health*, 125, (1), pp 18

Hudson, R., (2004), Conceptualizing Economies and Their Geographies: Spaces, Flows and Circuits, *Progress in Human Geography* 2004; 28; 447 – 471

Hudson, R., (2005), *Economic Geographies*, Sage: London

Hulme, M., and Turnpenny, J., (2004) , Understanding and Managing Climate Change: The UK Experience,*The Geographical Journal*, Vol. 170, No. 2, June 2004, Pp. 105–115

Huxley, M. 2007 Geographies of governmentality in J. Crampton and S. Elden (eds) 2007, *Space, Knowledge, Power: Foucault and Geography*, Ashgate, London.

Ingold, T., (2005), "Epilogue: Towards A Politics Of Dwelling", *Conservation and Society*, Vol 3, 2, Pp.501-508.

Jacobs, J., (2006), A Geography Of Big Things, *Cultural Geographies*, 2006 13: 1-27

Jasanoff, S., 1998, *The Fifth Branch: Science Advisers as Policymakers*, Harvard University Press

Jasonoff, S., 1997, *Comparative Science and Technology Policy*, Elgar, London

Jessop, B., (2008), *State Power*, Polity Press, Cambridge

John H. Vandermeer (1972) On the Covariance of the Community Matrix. *Ecology*: Vol. 53, No. 1, pp. 187-189

Jones, E and Leach , M.,(2000), Devolving Residential Energy Efficiency Responsibility To Local Government: The Case Of HECA, *Local Environment*, Volume 5, Issue 1 February 2000 , Pages 69 – 81

Jones, M., Jones, R., and Woods, M., (2004*), An Introduction To Political Geography: Space, Place and Politics*, Routledge, London.

Jordan, Andrew, Rüdiger Wurzel, Anthony Zito (2005): 'The Rise of 'New' Policy Instruments in Comparative Perspective': Has Governance Eclipsed Government?', *Political Studies* 53, 3: 477-496.

Kaljonen, M., , (2005) , "Co-Construction Of Agency and Environmental Management. The Case Of Agri-Environmental Policy Implementation At Finnish Farms", *Journal Of Rural Studies*, V22 N2 P205-216 Apr 2006

Kern, F., and Smith, A,. (2008), "Restructuring Energy Systems For Sustainability? Energy Transition Policy In The Netherlands", *Energy Policy*, Volume 36, Issue 11, November 2008, Pages 4093-4103

Kickert, L. M., Klijn, E., and Koppenjan, J. F. M., (1997), "Introduction" In Kickert, L. M., Klijn, E., and Koppenjan, J. F. M., (Eds) *Managing Complex Networks*, Sage, London

Kingdon, J. W. (1984). *Agendas, Alternatives, And Public Policies*. Boston: Little Brown.

Koppenjan, J,. F. M., (2007), “Consesnus and Conflict On Policy Networks: Too Much Or Too Little?”, In Sorenson, E., and Torfing, J., (Eds.) *Theories Of Democratic Networks Governance*, Palgrave, London.

Kwa, C., (2002), “Romantic and Baroque Conceptions Of Complex Wholes In The Sciences”, In *Complexities: Social Science Of Knowledge Studies,* Eds Law, J., & Mol, A. , 2002, London: Duke.

Latour, B,. (1987), *Science In Action: How To Follow Scientists and Engineers Through Society* (Cambridge, Ma:. Harvard University Press, 1987).

Latour, B., (1999), On Recalling Ant, In In Law, J., and Hassard, J., (Eds) *Actor Network Theory and After*, London , Blackwell

Latour, B., (2004) *Politics of Nature: How to Bring the Sciences into Democracy*, Harvard University Press, Cambridge, Mass., USA, 2004

Latour, B., (2005), *Reassembling the Social*, Oxford, Clarendon.

Law, J., (2004) *After Method*, Oxford: Routledge

Law, J., and Hassard, J., (1999), *Actor Network Theory and After*, (Eds) Blackwell:London

Law, J., and Mol, A., (2002), “Introduction” In *Complexities: Social Science Of Knowledge Studies* Eds Law, J., & Mol, A. , 2002, London: Duke.

Law, J., and Urry, J., (2004) “Enacting The Social”, *Economy and Society*, Volume 33, Number 3, Pp390-410

Lee, R., (2006), The Ordinary Economy: Tangled Up In Values and Geography, *Transactions Of The Institute Of British Geographers*,31, Pp413–432.

Leigh-Starr, S., (1995) "Introduction," In *Ecologies Of Knowledge: Work and Politics In Science and Technology*, Susan Leigh Star (Ed.). State University Of New York Press.

Lemke, T (2000), *Foucault, Governmentality and Critique*, Paper Presented At The Rethinking Marxism Conference, University Of Amherst (MA), September 21-24, 2000.

Leyshon, A. Lee, R. Williams, C. (2003*), Alternative economic spaces: rethinking the economic in economic geography*, Sage London.

Li, T. M. (1999) 'Compromising Power:Development, Culture and Rule In Indonesia', *Cultural Anthropology* 14: 1 28.

Lorenzoni, I., Nicholson-Cole, S. and Whitmarsh, L. (2007) Barriers perceived to engaging with climate change among the UK public and their policy implications. Global

Lorimer, H. (2005) "Cultural Geography: The Busyness Of Being More-Than-Representational", *Progress In Human Geography,* 29, 1, Pp83-94

Lovell H, Bulkeley H, Owens S, (2009), "Converging Agendas? Energy and Climate Change Policies In The UK" *Environment and Planning C: Government and Policy* 27(1) 90 – 109

Lovell H, Bulkeley H, Owens S, 2009, "Converging agendas? Energy and climate change policies in the UK" *Environment and Planning C: Government and Policy* 27(1) 90 – 109

Lovell, H., (2005) "*The Government Of Emerging Socio-Technical Systems: The Case Of Low Energy Housing In The UK*", Emmanuel College, University Of Cambridge, Phd Thesis.

Lovell, H., (2005a) "*Researching Low Energy Housing. Using STS Theory*" , [Online], Www.Geography.Dur.Ac.Uk/Conferences/Low_Energy_Housing/Hsingsts_Hovell_Final.Pdf – (Accessed 28/05.2006)

Lovell, H., (2007), "The Governance Of Innovation In Socio-Technical Systems: The Difficulties Of Strategic Niche Management In Practice", *Science and Public Policy*, 34 (1), February 2007, Pages 35-44.

Lovell, H., (2008), Discourse and Innovation Journeys: The Case Of Low Energy Housing In The UK , *Technology Analysis & Strategic Management*, Volume 20, Issue 5 September 2008 , Pages 613 - 632

Mackenzie, D. (2004). The Big Bad Wolf and The Rational Market: Portfolio Insurance, The 1987 Crash and The Performativity Of Economics. *Economy and Society* Volume 33, 3 , 303-334.

Mackenzie, D., (2006), *An Engine, Not A Camera: How Financial Models Shape Markets*, Cambridge, MIT Press, 2006, Cambridge, Ma.

Macleod, G., Goodwin, M., (1999), Reconstructing An Urban and Regional Political Economy: On The State, Politics, Scale, and Explanation, *Political Geography* 18 (1999) 697–730

Macnaghten, P., (2003), Embodying The Environment In Everyday Life Practices, *Sociological Review,* 51 (1), Pp. 63-84.

Macnaghten, P., and Jacobs, M., (1997), Public Identification With Sustainable Development, *Global Environmental Change*, Volume 7, No 1, Pp 5-24

Mander, S., L., (2007) "Regional Renewable Energy Policy: A Process Of Coalition Building", *Global Environmental Politics* 7.2 (2007) 45-63

Marsh, D., and Rhodes, R. A. W. (1992), *Policy Networks In British Government*, Clarendon: Oxford

Medd W, Marvin S, (2008), "Making Water Work: Intermediating Between Regional Strategy and Local Practice" *Environment and Planning D: Society and Space* 26(2) 280 – 299

Mill, J. S. 1861, *Utilitarianism*, Re-issued in 2002 by Hackett, London

Miller, G and Fox, K.J (2004) Building Bridges: The Possibility Of Analytic Dialogue Between Ethnography, Conservation Analysis and Foucault, In Silverman, D (Eds) *Qualitative Research: Theory, Methods and Practice*. Sage Publications, London, Pp. 35-55.

Mitchell, C., (2007) *The Political Economy of Sustainable Energy*, Palgrave, UK.

Mol, A. P. J. (2000) The Environmental Movement In An Era Of Ecological Modernisation¸ *Geoforum* 31 (1) Pages 45-56

Mol, A., (1999), Ontological Politics: A Word and Some Questions, In Law, J., and Hassard, J., (Eds) *Actor Network Theory and After*, London , Blackwell

Morris, Sir Parker. *Homes For Today and Tomorrow*. Ministry Of Housing and Local Government, London, 1961

Mullainathan, S., & Thaler, R. H., 2000. "*Behavioral Economics*," NBER Working Papers 7948, National Bureau of Economic Research, Inc. [online], Available at http://ideas.repec.org/p/nbr/nberwo/7948.html, (Accessed 01/09/2009)

Murdoch, J (2000), Space Against Time: Competing Rationalities In Planning For Housing, *Transactions Of The Institute Of British Geographers*, 25, Pp 503–519

Murdoch, J., (1998) "The Spaces Of Actor-Network Theory" *Geoforum*, Vol. 29, No. 4, Pp. 357 – 374

Murdoch, J., (2006), *Post-Structuralist Geography: A Guide To Relational Space,* London; Sage.

Murray Li , T., (2007)'Practices Of Assemblage and Community Forest Management', *Economy and Society,*36:2,263— 293

Murray Li , T., 1999 "Compromising Power: Development, Culture and Rule in Indonesia" *Cultural Anthropology* 40(3): 277-309.

NAREC, *Project Havemor* [Online] (Accessed 8/01/2008) Http://Www.Narec.Co.Uk/Main/St806

NCC, (2006), Newcastle City Council [Online][Accessed 16/052008]. Available At Http://Www.Newcastle-Staffs.Gov.Uk/Documents/Housing/Affordable%20warmth%20strategy%202006-10.Pdf

NEA, (2000) *Assessing Fuel Poverty: Priorities For Affordable Warmth Programmes*, [Online], available from Http://Www.Nea.Org.Uk/Policy&Research/, (Accessed 12/12/2008)

NEA, (2006), *Energy Efficiency Commitment 3, Consultation Document Response*, Http://Www.Nea.Org.Uk/Policy&Research/Downloads/Responses/2006/The_Energy_Efficiency_Commitment_April_2008_To _March_2011.Pdf

NEA, (2008), *Fuel Poverty Set To Return To 1997 Levels,* [Online][Accessed 15/05/2008]. Available At Http://Www.Nea.Org.Uk/Media_Centre/News_Releases

NEA, (March 2006) *Energy Action Bulletin,* Newcastle Upon Tyne.

NEF, 2005, *Behavioural economics: seven principles for policy makers*, [Online] Available at http://www.neweconomics.org/gen/z_sys_publicationdetail.aspx?pid=213, (Accessed 12/03/2009)

Newell, P., (2000), *Climate For Change: Non-State Actors and The Global Politics Of The Greenhouse*, Cambridge University Press, Cambridge

Office Of Gas and Electricity Markets , *The Social Action Plan*., London, March 2000

Office Of Gas and Electricity Markets, (2004), *EEC Update Issue 8*, [Online], Available At Http://Www.Office Of The Gas and Electricity Markets.Gov.Uk/SUSTAINABILITY/ENVIRONMENT/ENERGYEFF/Documents1/7145-Eecmay04.Pdf, (Accessed 24/2/2009)

Office Of Gas and Electricity Markets, (2008), *A Review Of The Energy Efficiency Committment 2005-2008,* [Online], Available At Http://Www.Office Of The Gas and Electricity Markets.Gov.Uk/Sustainability/Environment/Energyeff/Prevschemes/Documents1/Annual%20Report%202008%20Final.Pdf, Accessed 23/3/2009.

Office Of Gas and Electricity Markets, August 2005, *A Review Of The Energy Efficiency Comittment 2002 - 2005: A Report For The Secretary Of State For Environment Food and Rural Affairs.* Office Of Gas and Electricity Markets, Http://Www.Office Of The Gas and Electricity Markets.Gov.Uk/Sustainability/Environment/Energyeff

Office Of Gas and Electricity Markets, February 2007*, EEC Update*, Office Of Gas and Electricity Markets, Http://Www.Office Of The Gas and Electricity Markets.Gov.Uk/Sustainability/Environment/Energyeff/Eecupdate

Okereke, C. (2006) Global Environmental Sustainability: Intragenerational Equity and Conceptions Of Justice In Multilateral Environmental Regime, *Geoforum*, 37 (5): 745-736.

ONS, 2001, *(2001) Census*, [Online][Accessed 16/05/2008]. Available From, Http://Www.Statistics.Gov.Uk/Census/

Owen, S., (2000), Commentary*, Environment and Planning A 2000*, Volume 32, Pages 1141 - 1148

Owens, S. (2004) "Siting, Sustainable Development and Social Priorities", *Journal Of Risk Research*, Volume 7, Issue 2, Pages 101-114.

Owens, S., and Driffill, L., (2008), "How To Change Attitudes and Behaviours In The Context Of Energy", *Energy Policy,* Volume 36, Issue 12, December 2008, Pages 4412-4418

Pain, R (2006), "Social Geography: Seven Deadly Myths In Policy Research", *Progress In Human Geography* 30, 2 (2006) Pp. 250–259palmer Et Al, July 2005

Palmer, J. , Campbell, R., Boardman, B., Saunders, J., (2005) "*Fuel Poverty Research Centre Scoping Study Report"*, ESRC Report, Environmental Change Institute.

Palousis, N., 2005, No nuclear solution, Eco Voice [online] (Available at http://www.ecovoice.com.au/evonline/evo-22/evo_0508_nukesolution.html) [Accessed 31/7/2009]

Parker Morris Committee (1961). *Homes for Today and Tomorrow*. London: Her Majesty's Stationery Office. ISBN 0117501263.

Parker, Rachel L. (2007) Networked governance or just networks? Local governance of the knowledge economy in Limerick (Ireland) and Karlskrona (Sweden). *Political Studies*, 55(1). pp. 113-132.

Pettenger, M, 2007, *The Social Construction of Climate Change. Power, Knowledge, Norms, Discourses,* Ashgate Publishing, 2007.

Pierre, J., (2000), *Debating Governance: Authority, Steering, and Democracy: Authority, Steering and Democracy,* OUP: Oxford

Pierre, Jon, and B. Guy Peters. 2000. *Governance, politics and the state*. Basingstoke, UK: Palgrave.

Poortinga, W., Bickerstaff, K., Langford, I., Niewöhner, J. & Pidgeon, N. The British 2001 Foot and Mouth Crisis: A Comparative Study Of Public Risk Perceptions, Trust and Beliefs About Government Policy In Two Communities. *Journal Of Risk Research.* 2004;7:73-90.

Powell, M., and Boyne, G., (2001), "The Spatial Strategy Of Equality and The Spatial Division Of Welfare" *Social Policy and Administration*, Vol. 35, No. 2 May 2001, Pp. 181 – 194

Prozorov, S., 2007*, Foucault, Freedom and Sovereignty*. Aldershot: Ashgate

Reckwitz, A. 2002. 'Toward a theory of social practices. A development in culturalist theorizing', *European Journal of Social Theory* 5: 243-63.

Rhodes, R. A. W., "Foreword" To Kickert, L. M., Klijn, E., and Koppenjan, J. F. M., (Eds) (1997) *Managing Complex Networks: Strategies For The Public Sector*, Sage, London

Rhodes, Rod A.W. 1990. "Policy Networks: A British Perspective." *Journal of Theoretical. Politics* 2:293

Richardson, L. & St. Pierre, E.A. (2005). Writing: A Method of Inquiry. In N.K. Denzin & Y. Lincoln (Eds.). *Handbook of Qualitative Research* (3rd ed.).(pp. 959-978). Thousand Oaks, CA: Sage

Rip, A. and Kemp, R.P.M. (1998) Technological Change. In: Rayner S., Malone E.L. (editors). In: *Human Choice and Climate Change. Vol. II, Resources and Technology*. Battelle Press, Columbus, Ohio

Roberts, N. C., and King, P. J., (1991) "Policy Entrepreneurs: Their Activity Structure and Function In The Policy Process", *Journal Of Public Administration Research and Theory*, 1(1991):2:147-175

Roberts, N.C. and King, P.J. "Policy Entrepreneurs: Their Activity Structure and Function in the Policy Process." *Journal of Public Administration Research and Theory*, I(2):147-175, 1991

Roberts, S, (2008), "Energy, Equity and The Future Of The Fuel Poor", *Energy Policy*, Volume 36, Issue 12, Pages: 4471-4474.

Rose, N., (1999) *Powers Of Freedom*, Cambridge University Press; Cambridge

Rudge, J & Gilchrist, R., 2005, "Excess Winter Morbidity among older people at risk of cold homes: a population-based study in a London Borough", in *Journal of Public Health*, Vol. 27, No. 4, pp353/358

Ruostetsaari , I., 2008, Nordic Elites in Comparative Perspective. In: Sasaki, Masamichi (ed.), *Elites: New Comparative Perspective*. Leiden/Boston: Brill 2008.

Ruostetsaari, I., (2008), Governance and Political Consumerism In Finnish Energy Policy-Making, *Energy Policy,* Volume 37, Issue 1, January 2009, Pages 102-110

Rutherford, S., (2007), Green Governmentality: Insights and Opportunities In The Study Of Nature"S Rule, *Progress In Human Geography* 31(3) (2007) Pp. 291–307

Rutland T, Aylett A, 2008, "The work of policy: actor networks, governmentality, and local action on climate change in Portland, Oregon" *Environment and Planning D: Society and Space* 26(4) 627 – 646

Rutledge, I., (2007), "New Labour, Energy Policy and 'Competitive Markets'", *Cambridge Journal Of Economics,* Volume 31, Issue 6, Pages 901-925.

Sairenen, R., 2000, *Environmental Governmentality As A Basis For Regulatory Reform: The Adaptation Of New Policy Instruments In Finland, unpublished thesis, The Centre For Urban And Regional Studies*, University Of Technology, Finland.

Sayer, A., (2005), Class, Moral Worth and Recognition, *Sociology,* 39, No.5, Pp947-963.

Schumpeter, Joseph. A. 1911[1934]. *The Theory of Economic Development*. Cambridge, Mass: Harvard University Press.

Schatzki, T. (1996). *Social Practices: A Wittgensteinian Approach To Human Activity And The Social*. Cambridge: university press.

Schmitter, P. C., & Lehmbruch, G. (Eds.). (1979). *Trends toward corporatist intermediation. Contemporary political sociology, Vol. 1*. London: Sage

Sefton, T. (2002) 'Targeting fuel poverty in England: is the government getting warm?', *Fiscal Studies* 23(3): 369

Sheingate, A., D., "Political Entrepreneurship, Institutional Change, and American Political Development, *Studies In American Political Development,* 17 (Fall 2003), 185-203

Shove, E., 2003, *Comfort, Cleanliness and Convenience*, Oxford: Berg.

Shove, E., Watson, M., Hand, M., and Ingram, J., (2007) *The Design of Everyday Life*, Oxford: Berg.

Silverstone, Hirsch and Morley, (1992) 'The Moral Economy of the Household' in, Silverstone R., & Hirsh, E. (1992). *Consuming Technologies: Media and Information in Domestic Spaces*, London: Routledge.

Slater, D. (2002) 'From calculation to alienation: disentangling economic Abstractions', *Economy and Society*, 31, 2,285-306

Smith, A., and Kern, F., (2009), The Transitions Storyline In Dutch Environmental Policy Environmental Politics, Vol. 18, No. 1, February 2009, 78–98

Smith A (2006b) Supporting and harnessing diversity? Experiments in alternative technology, ESRC End of Award Report reference number RES-332-25-0005, SPRU, University of Sussex

Smith, S. J., (2001) " Doing Qualitative Research: From Interpretation To Action", In Limb, M. and Dwyer, C., (Eds) *Qualitative Methodologies For Geographers: Issues and Debates*, London:Arnold

Smith, S. J., 2005, "States, Markets and An Ethic Of Care", *Political Geography*, 2005.

Smith, S. J., and Easterlow, D., (2004) "Housing For Health: Can The Market Care?", *Environment and Planning A,* Volume 36, P999-1017

Sorenson, E., and Torfing, J., (Eds.) (2007), Th*eories Of Democratic Networks Governance*, Palgrave, London.

Spaargaren, G. (2000) "Ecological Modernization Theory and Domestic Consumption" Journal Of *Environmental Policy and Planning*, 2 (4) Pages 323-335

S. Stoll-Kleemann, T. O'Riordan and C.C. Jaeger, (2001), The Psychology Of Denial Concerning Climate Mitigation Measures: Evidence From Swiss Focus Groups, *Global Environmental Change* 11 (2001), Pp. 107–117

Strauss, A., (1987), "*Qualitative Analysis For Social Scientists*", Cambridge University Press, Cambridge.

Strauss, K., (2008) Re-Engaging With Rationality In Economic Geography: Behavioural Approaches and The Importance Of Context In Decision-Making, *Journal Of Economic Geography* 8, Pp. 137–156

Sustainable Development Commission, July 2008, *Domestic Energy Bills and Costs Of Implementing Environmental Measures*, [Online] Accessed 26/3/2009, Available At Http://Www.Sd-Commission.Org.Uk/Publications.Php?Id=768.

Swyngedouw, E.., (2006) Invited Paper "*The Apocalypse As Strange Attractor: Sustainability and Sustainability Policy As Post-Political Populism*", Special Session Sponsored By Local Environment On Environmentalism & Sustainability & Injustice, Organised By Prof. G. Walker, IBG-RGS Annual Meeting, London, 29 August – 1 September

Taylor, P. J., and Flint, C., (2000), *Political Geography*, Pearson, Essex.

Thrift N (2000), Afterwords, *Environment and Planning D: Society and Space* 18 (3): pp. 213-255

Thrift, N. J., (2003) "Performance and …" *Environment and Planning A*, 35, 2019-2024

Thrift, N. J., (2004) Summoning Life, In P.Cloke, P. Crang and M.Goodwin (Eds) (2004) *Envisioning Human Geographies* (Arnold, London)

Thrift, N. J., (2006), "Space", *Theory, Culture & Society*, Vol. 23(2–3): 139–155

Thrift, N., J., (1996) *Spatial Formations*, London , Sage.

Thrift, N., J., (2003) Practicing Ethics, In *Using Social Theory*, Pyrke, Rose & Whatmore, Sage 2003

Torfing, J. and Sorenson, E., (Eds),(2007) *Theories Of Democratic Network Governance*, Palgrave Macmillan; Basingstoke.

Van Vliet, B., Chappells, H., and Shove, E., 2005, *Infrastructures of Consumption*, London: Earthscan.

Vandermeer, 1972 J.H. Vandermeer, Niche theory, *Annual Review of Ecology and Systematics* 3 (*1972*), pp. 107–132

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, Environmental Concern, And Environmental Behavior: A Study Into Household Energy Use. *Environment and Behaviour*, 36 (1), 70-93.

Walcott, (2001), *Writing Up Qualitative Research* , SAGE, London

Walker G., (2008) "What Are The Barriers and Incentives For Community-Owned Means Of Energy Production and Use", *Energy Policy*, 36(12), 4401-4405

Walker, G. P., and Bulkeley, H.,(2006) Geographies Of Environmental Justice. *Geoforum*, 37 (5). Pp. 655-659.

Walker, G., and Cass., N., (2007), "Carbon Reduction, "The Public" and Renewable Energy: Engaging With Socio-Technical Configurations", *Area*, Volume 39 Issue 4, Pages 458 - 469

Walker G P, Devine-Wright P and Evans B (2006) Embedding socio-technical innovation?: niche management and community-based localism in renewable energy policy in the UK, Proceedings of The Future of Science, Technology and Innovation Policy Conference, September 2006 [online], Available at http://geography.lancs.ac.uk/cei/CommunityEnergyKeyPublications.htm, (Accessed 01/08/2009)

Whatmore, S, (2002) *Hybrid Geographies*, London: Sage

WHO, 2008, *The health impacts of 2003 summer heat-waves Briefing note for the Delegations of the fifty-third session of the WHO Regional Committee for Europe* [online], Available from http://www.euro.who.int/document/Gch/HEAT-WAVES%20RC3.pdf, (Accessed 4/03/2009)

Wicks, M., (1978), *Old and Cold: Hypothermia and Social Policy*., Heinemann, London.

Wilkinson P, Pattenden S, Armstrong B, Fletcher A, Kovats RS, Mangtani P, et al. *Vulnerability to winter mortality in elderly people in Britain: population based study.* BMJ 2004;329: 647-0

Wolin, S., 1961, *Politics and Vision*, London: Allen and Unwin

Wood, D. M., Beyond the Panopticon? Foucault and Surveillance Studies, in Crampton, J. & Elden, S. *Space, Knowledge and Power: Foucault and Geography*. Aldershot: Ashgate; 2007.

Wright, F., 2004, Older and Colder: the views of older people experiencing difficulties keeping warm in winter. *Social Policy and Administration*, 38(5), October 2004, pp.488-503.

Wynne, B., (2006), Guest Lecture, "*Hazard, Risk and Security: Sustainability Questions For Science and Society*", Opening Guest Lecture Of The Institute For Hazard and Risk Research, University Of Durham

Young, A., (2001), *The Politics Of Regulation*, Palgrave, London